INDUSTRIAL MEDICINE AND SURGERY

INDUSTRIAL MEDICINE

The Journal of Medicine in Industry

This Journal is dedicated to the advancement of sound industrial medicine, including the surgery of industrial trauma. To that end its varying contents will embrace scientific papers, reports, digests, news items and official statements, together with editorial comment. The editorial policy is to avoid undue censorship. Some contributions ably prepared will be published although contravening the personal opinions of the editors. Care will be exercised in checking the accuracy of known facts, as printed, but in all other respects statements and opinions are those of the author and may not be shared by the editors. On any article, the editors reserve the right to comment favorably or otherwise, in the current or any subsequent issue. On this basis, contributions are invited. The opinions expressed in any contributions, including the editorials of this Journal, do not necessarily reflect the attitude or opinions of any associated organization.

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Manganese Poisoning

Environmental and Medical Study at a Chilean Mine

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THE PRESENT study, by members of the Department of Industrial Hygiene and Occupational Medicine of the National Health Service of Chile, was stimulated by the discovery in the clinical section of the Department of a typical case of manganism in an employee at a manganese mine which had to that time contributed no known case of the disease. An industrial hygiene engineer and two physicians, both specialists in occupational medicine, spent 10 days at the mine where they made standard environmental studies and carried on specially designed clinical examinations of selected miners. Selections for clinical examination were based on two criteria: long-term exposure and/or the presence of symptoms or gross changes suggestive of manganism. Because of this method of selection, the data are not intended to suggest incidence rates. Our purpose, rather, has been to develop a definitive description of industrial manganese poisoning.

Community Aspects

THE MINE referred to in this study is located in the province of Coquimbo in the semidesert region of northern Chile. The locale has an altitude of about 1000 meters (about 3,300 feet) above sea level, and has a mild, continental climate. The lack of rainfall is reflected in the scantiness of vegetation, and results in an inadequate water supply for the mine. The community has a population of 1,200, of whom 370 are miners. Housing facilities are only partially satisfactory. Water for domestic use has to be brought by truck or donkey from nearby wells and stored in open tanks among the lodgings. Sanitary conditions are extremely deficient.

Extraction Procedures

THE MINE lies in a zone with many geological faults which make impossible a systematic and complete exploitation with usual modern methods. The veins are generally small (20 to 50 inches), and are followed through numerous galleries as these lie in the rock formation. Ore is extracted by small teams of miners using primitive methods. Two basic types of workers are employed at this. The first, called drillers, open the galleries and extract the ore from the veins, using explosives placed in holes that have been made with hand-drill or chisel and hammer.

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CHART I.
MINERALOGIC TERMS PERTAINING TO MANGANESE ORES
COMPARISON OF VARIOUS USAGES OF THE TERMS

German Usage	English Usage	Usage in U.S.A.
Braunit Mn_2O_3	Braunite $(MnSi)_2O_3$	Braunite $Mn_2O_3+xMnSiO_4$
Hausmannit (Mn, Zn) Mn_2O_4	Hausmannite $MnMn_2O_4$	Hausmannite Mn_3O_4
Manganit MnO (OH)	Manganite MnO (OH)	Manganite MnO (OH)
Psilomelan MnO_2 (MnO, BaO, K_2O, H_2O)	Psilomelane $BaMnMn_8O_{16}(OH)_4$	Psilomelane MnO_2+x (MnO, BaO, K_2O, H_2O)
Pyrolusit MnO_2+nH_2O	Pyrolusite MnO_2	Pyrolusite MnO_2+nH_2O

Shooting usually takes place twice a day. The second type of miner is essentially a carrier. He removes the ore and waste material, taking it on his back in a leather bag to the outside or to a conveyor belt.

Because of the lack of water, dry drilling must be employed. The dust produced by this work is not satisfactorily removed. The multiplicity and complexity of the galleries restrict natural ventilation, and the available electric power is insufficient to support an adequate, mechanical ventilating system. The introduction of the pneumatic drill to these operations in 1953 was followed by an immediate and marked increase of new cases of manganese poisoning, and after a three-months' trial the use of this device was abandoned.

Mineralogy

THE ORES extracted are relatively pure oxides of manganese. Chart I presents the nomenclature and chemical composition of the ores arranged for ready identification according to three systems of terminology: German usage, English usage, and customary usage in the United States. Of the manganese present in the mineral extracted from the Chilean mine under discussion, 70% is in the form of pyrolusite ($MnO_2 + H_2O$). Braunite, manganite, and hausmannite are present in minor concentrations. Of the complex oxides of manganese, only psilomelane is present in noteworthy amount. These ores have variable forms: pyrolusite is dry and powdery when practically pure, or has a soap-like consistency when it contains water; whereas psilomelane and hausmannite are very hard and crystalline. The manganese content of the ores varies from 40% to 60% as shown by the seven representative analyses in Table I.

The air samples of this study were collected with an MSA electrostatic precipitator powered with automobile storage batteries, the required 110-volt alternating current being produced by means of vibrators and transformers. In every case one cubic meter of air was passed through the precipitator in 14 minutes and six seconds. Determinations of manganese content were made with the ammonia persulfate colorimetric method, readings being made in a Beckmann spectrophotometer with 525 millimicrons wave length. Table II presents the results of air sampling and analysis in two successive years (1954 and 1955) during various underground operations with diverse minerals. The lowest concentrations were found during pure rock drilling, 0.5 to 5.0 mg. Mn./M^3 air, whereas the concentrations found in conjunction with drilling manganese bearing rock ranged as high as 46.0 mg. Mn./M^3 air (one sample). If 6 mg. Mn./M^3 air be considered the maximal permissible concentration for eight hours of exposure at work, it can be seen that many of the recorded values are of unsafe levels. High concentration values are to be found in association with dry-drilling manganese ore either pure or mixed with rock, whereas the lower values occur in conjunction with work in pure rock or in manganese ores which are either naturally or artificially wet. The variability of concentrations of manganese in air during the same kind of work can be explained by two factors which may operate together or separately. One is the continual change in quality of the wall material being worked upon, and the other is the change in natural ventilation brought about by the advancing locations of galleries. The consequent variations in air contamination make it impossible to define with reasonable accuracy the exposures which produced the cases of manganese poisoning herein reported. For the time being, it is sufficient to conclude that underground employ-

TABLE I.
MANGANESE CONTENT OF CHILEAN ORES
SEVEN REPRESENTATIVE SAMPLES

Sample No.	Percentage Mn in Sample
1	53.3
2	39.9
3	60.3
4	53.2
5	54.5
6	40.3
7	42.8

TABLE II.
MANGANESE CONTENT OF THE AIR IN PROXIMITY OF VARIOUS TYPES OF MINE WORK

Air Samples	Type of Work	Mgm. Mn/M^3 Air 1954	1955
1 - 7	Drilling pure dry ore	16.3, 11.6 3.8, 11.2	10.0, 11.3 11.1
8 - 10	Drilling pure wet ore		1.8, 2.3 5.0
11	Drill and hand-selecting pure ore		8.5
12 - 19	Drilling manganese-bearing rock	8.6	7.0, 3.5 20.0, 46.0 7.6, 10.0
20 - 21	Same as 12 - 19, drilling and shovelling	2.6 1.8	
22 - 39	Drilling rock	0.8 0.6, 1.1 1.7, 1.5 0.5, 1.5 3.1, 1.7 2.9, 1.2	3.5, 2.3 5.0, 1.3 2.4, 8.0 4.0

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TABLE III.
DISTRIBUTIONS OF AGES AND EXPOSURE PERIODS OF 15 MINERS WITH MANGANESE POISONING

A. Age Distribution	
Years	No.
21 - 30	2
31 - 40	6
41 - 50	5
over 50	2
B. Exposure Periods	
Years	No.
under 1	1
1 - 3	2
4 - 6	2
7 - 9	3
over 9	7
Average	8 years, 2 months
Minimum	9 months
Maximum	16 years

ment at the mine has been associated with substantial exposures to airborne manganese dusts.

Medical Aspects

GENERAL CONSIDERATIONS. Of the 370 employed miners, 83 were selected for detailed clinical examination, giving emphasis to psychological and neurological abnormalities. Selections for examination were based upon histories of high exposure or upon spontaneous complaints of symptoms generally associated with manganese poisoning. Fifteen workers, nine from the survey and six from subsequent case studies, were finally chosen as having typical manganese poisoning. Our data are not intended to suggest incidence rates; rather, the details of our cases are analyzed herein for the purpose of contributing to a clear understanding of this clinical syndrome.

The distribution of ages and years of exposure of 15 miners with manganese poisoning is shown in Table III. The exposure periods ranged from nine months to 16 years, with an average of about eight years. The symptomatology in several of the cases was initiated during a brief period of pneumatic drilling. The influence of dry pneumatic drilling upon the development of manganese poisoning had been demonstrated in an earlier report from our Department by Ansola *et al*[1] who found that cases developed from exposures lasting 49 to 480 days, the average being 178 days. That study was done at another mine (San Juan de Antofagasta) where all drilling was carried on with pneumatic machines. Of the 15 cases in the present study, 13 occurred among drillers and two in samplers. Except for the brief period noted, only hand drills were used.

ASSOCIATED HEALTH PROBLEMS. Alcohol was consumed sparingly or not at all by 11 of the miners in our series of cases, and was used moderately or excessively by four; so we concluded that previous or concomittant alcoholism is not a requirement for the development of industrial manganism. No relationship was discovered between development of the condition and personal or familial histories of psychiatric disturbance. In one of our cases the typical psychiatric disturbance of manganism had its onset during an attack of hepatitis; but acute disease, including infectious processes, seemed to play no part in the onset of any other case.

PSYCHOMOTOR DISTURBANCES. All of the 15 cases herein reported presented psychomotor disturbances of some kind. A group of disturbances collectively designated emotional instability occurred in slightly more than half of the cases. Irritability, restlessness, and a tendency to weep were prominent features in this group. Apathy was next in the order of frequency (47%) as a symptom, followed by hallucinations (40%); and flights of ideas, compulsory acts, and verbosity were noted in descending order. The hallucinations experienced by these patients were in some cases exclusively visual and in others acoustic. Mixed types also occurred. The visual hallucinations were usually vivid, precise, and most disturbing to the patient, and were generally of the zoopsia type. Two patients had prolonged periods of micropsia and one had macropsia. Compulsory acts, when present, were the first outward manifestations of emotional disturbance. The experiences included uncontrollable impulses to sing, run aimlessly, or to flee, or to break things despite some insight into the impropriety of such acts. The abnormality, flight of ideas, was present to a moderate degree in one-third of the cases, sometimes in conjunction with confusion. Restlessness occurred in four cases, associated usually with some degree of euphoria and optimism. Verbosity was an observation in four cases, being exhibited during the recording of occupational and medical histories. In general, all 15 patients were well oriented as to time and place, without important alterations in memory, intelligence, or judgment. A few had noted in themselves the slowness of speech frequently associated with the condition. The distribution of these various disturbances among the 15 cases is shown in Table IV.

NEUROLOGICAL SYMPTOMS. Although psychomotor disturbances, when present, comprised the more dramatic aspects of these cases of manganism, the changes characterized as neurological symptoms occurred with greater frequency and consistency. Table V lists 11 such symptoms, and shows their distribution among the 15 cases. The combination of asthenia and adynamia occurred in 14 (93%) of the patients. Usually the onset was slow and manifested itself as an increasing difficulty in the performance of hill climbing, use of hand tools, and loading of ore. In the more advanced cases the performance of these acts was painful. Sialorrhea occurred in 13 cases, was present to varying degrees, and was usually most marked during periods of psychomotor excitation. Fatigability was also present in 13 cases, and manifested itself objectively in a marked decrease in work productivity.

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Cephalalgia, varying in intensity and location, was present in 12 cases, the severity of the symptom generally being parallel with that of other neurological symptoms. Disturbances of sleep occurred among 12 patients, usually in the form of terrifying dreams of fatal accidents, quarrels with relatives or fellow miners, or appearances of ghastly figures. Insomnia occurred rather frequently, and sleepiness in a lesser extent. Muscular pains occurred in 10 cases, usually in association with asthenia and fatigability. From the foregoing it is seen that 10, or two-thirds, of these cases had a set of six neurological symptoms in common: asthenia, sialorrhea, fatigability, cephalalgia, disturbed sleep, and muscle pains. The symptoms were not all present in all 10 cases, but did occur with great frequency among them. Two of these symptoms, asthenia and sialorrhea, occurred in almost all of the patients herein reported.

Among the less frequently occurring neurological symptoms, paresthesias were experienced by nine patients. The abnormal sensations included numbness, tingling or prickling, and abnormal perceptions of heat and cold. Excessive sweating was experienced by six patients, and five had become aware of a change in the manner of speech. Diminution, even abolition, of libido occurred in the four patients considered to be most severely afflicted with manganism, and, of these, three also complained of great delay in ejaculation time.

NEUROLOGICAL SIGNS (Table VI). The characteristic changes of manganese poisoning comprise a group of well recognized neurological signs. The most important of these are muscular hypertonia, a mask-like face, and gait changes. Hypertonicity occurred in 13, or 87%, of the cases in the present series. It had an extrapyramidal character (as in Parkinsonism), with preferential involvement of the face, neck and proximal portions of extremities, and normal or only slightly augmented reflexes. All 13 of the cases with muscular hypertonia had this change in the upper extremities; and all but two of these had similar involvement of the lower extremities. Repeated passive movements resulted in marked exaggeration of the hypertonia, producing in some cases a characteristic cogwheel sign. There was a remarkable slowing of both active and passive movements of the extremities, again as in Parkinsonism. The puppet test was abnormal in 10 of the cases, with decided limitation of motion and no loss of coordination. Rigidity of facial expression, or mask-like face, was observed in two-thirds of all cases. Apparently this change occurs early, and is to be watched for in persons exposed to the hazard of manganese poisoning. One of the patients had a spastic grin, and another had a marked tremor of the tongue. A characteristic change in gait also occurred in two-thirds of the

TABLE IV.
PSYCHOMOTOR DISTURBANCES IN 15 CASES OF MANGANISM

Type of Disturbance	Disturbances in Each Case															Cases in Which Each Disturbance Occurred	
																Number	Percent
1. Emotional Instability																8	53
a. Irritability	+	+	+	−	+	+	+	+	−	−	−	−	−	−	−	7	
b. Restlessness	+	+	−	+	+	−	−	−	−	−	−	−	−	−	−	4	
c. Tendency to Weep	+	+	−	−	+	−	−	−	−	−	−	−	−	−	−	3	
d. Withdrawal from Group	+	+	−	−	−	−	+	−	−	−	−	−	−	−	−	3	
e. Unmotivated Laughter	−	+	−	−	−	−	−	−	−	−	−	−	−	−	−	1	
2. Apathy	+	−	+	−	−	+	−	+	+	+	+	−	−	−	−	7	47
3. Hallucinations	+	−	+	−	−	−	−	−	+	+	−	+	+	−	−	6	40
4. Flight of Ideas	+	−	+	+	−	+	−	−	−	−	−	−	−	+	−	5	33
5. Compulsory Acts	+	−	−	+	+	−	−	−	−	−	+	+	−	−	−	5	33
6. Verbosity	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	4	27
Total Number Disturbances Each Case	9	6	5	4	4	3	2	2	2	2	2	2	1	1	0		

TABLE V.
NEUROLOGICAL SYMPTOMS IN 15 CASES OF MANGANISM

Symptom	Symptoms in Each Case															Cases in Which Each Symptom Occurred	
																Number	Percent
Asthenia and Adynamia	+	+	+	+	+	+	+	+	+	+	+	+	−	+	+	14	93
Sialorrhea	+	+	+	+	+	+	+	+	+	+	+	−	+	+	−	13	87
Fatigability	+	+	+	+	+	+	+	+	−	+	+	−	+	+	+	13	87
Cephalalgia	+	+	+	+	+	+	+	+	+	+	−	+	+	−	−	12	80
Disturbances of Sleep	+	+	+	+	+	+	+	+	+	+	−	+	+	−	−	12	80
Muscle Pains	+	+	−	+	+	+	+	−	+	−	+	+	−	−	+	10	67
Paresthesias	+	+	+	−	+	+	+	+	+	−	+	+	−	−	−	9	60
Diaphoresis	+	+	+	+	+	−	−	−	+	−	−	−	−	−	−	6	40
Disturbances of Speech	+	−	+	+	−	+	−	+	−	−	−	−	−	−	−	5	33
Disturbances of Libido	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	4	27
Disturbances of Ejaculation	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	3	20
Total Number Symptoms in Each Case	11	10	10	9	8	8	7	7	7	5	5	4	4	3	3		

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TABLE VI.
NEUROLOGICAL SIGNS IN 15 CASES OF MANGANISM

Signs	Signs in Each Case														Cases in Which Each Sign Occurred	
															Number	Percent
Muscular Hypertonia	+	+	+	+	+	+	+	+	+	+	+	—	—	+	13	87
Expressionless Face	+	+	+	+	+	+	+	+	—	+	—	—	+	—	—	10	67
Gait Changes	+	+	+	+	+	+	+	+	—	+	—	—	+	—	—	10	67
Monotonous Voice	+	—	+	+	+	—	+	+	+	—	—	—	—	—	—	7	47
Tremor, Upper Extremities	+	+	+	—	—	+	—	—	+	—	—	—	—	+	—	7	47
Tremor, Lower Extremities	+	+	+	+	—	+	—	—	+	—	+	—	—	—	—	6	40
Superficial Sensory Disturbance	+	+	+	+	—	—	—	—	—	—	—	—	—	—	—	4	27
Deep Sensory Disturbance	+	+	+	—	+	—	—	—	—	—	—	—	—	—	—	4	27
Impaired Hearing	—	—	—	+	—	—	—	—	—	—	—	+	—	+	—	3	20
Postural Changes	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	2	13
Diplopia	—	+	—	—	—	+	—	—	—	—	—	—	—	—	—	2	13
Pyramidal Signs	—	—	—	—	+	—	+	—	—	—	—	—	—	—	—	2	13
Total Number Signs in Each Case	9	9	8	7	6	6	5	4	4	3	2	2	2	2	1		

cases. Walking is begun with slow steps, the arms drooped without motion at the sides. The foot is advanced in plantar flexion, sliding rather than lifting the toes across the floor. Four patients showed antepulsion, and two walked with legs somewhat apart and slightly flexed. Jaksch sign, or cockwalk, was not observed.

Monotonous speech and muscular tremor constitute the next most frequently observed group of neurological signs. Seven, or 46%, of the cases had speech that was unmodulated, low in volume, and blurred so that understanding was difficult for the examiner. Six of the patients had dysarthria and one stammered. No case of motor aphasia was found. Muscular tremor was present in both the upper and lower extremities with about equal frequency (about 45%). The intensity of this change is variable throughout the development of the disease. Decrease in muscular strength, although difficult to demonstrate in a standard neurological examination, was nevertheless considered to be present, more prominently in the lower than in the upper extremities.

Changes in sensorium occurred in about one-fourth of the cases. Three patients had impaired hearing. Alteration of the pain sense was observed in four cases, of touch in three, of thermal sense in two, and of tactile discrimination in one. Four patients had changes of deep or muscular pain sense, and two had impairment of segmental attitude sensation. In no case was a change discovered in the feeling of pressure (baresthesia) or the appreciation of weight (barognosis). One patient evidenced astereognosis. No modification was discovered in the visceral sensibility. Four of the patients were hypersensitive to pressure over nerve trunks. The handwriting was characterized by a tendency to use small letters (micrographia). Special sense organ examinations revealed marked impairment of hearing in three patients, and diplopia in two.

Findings of apparently insignificant frequency included an altered stance in two cases, one marked by forward bending and another by slight flexion of the trunks and legs. In the more advanced cases a certain tautness was observed in seated patients who avoided crossing the legs and let the arms hang along the trunk. One showed cerebellar signs, and another had an alteration of postural reflexes with a tendency to fall. The rare occurrence of pyramidal signs is of value in distinguishing manganism from postencephalitic Parkinsonism. Only two of the patients in the present series had such signs. One had positive Babinski, Oppenheim and Chaddock reflexes with increased knee and ankle jerks as well as lower extremity clonus; and the other had a faintly positive Babinski reflex.

A questionably related finding was an apparent widening of retinal veins as seen on fundoscopy, a finding which was especially marked in two of the cases.

Comment

THE OBSERVATIONS in this study support the generally held view[1,5] that inhalation represents the principal hazard in industrial exposures to manganese. This point was adequately demonstrated at the mine responsible for the present cases when the incidence rate of new cases rose sharply during a brief period of dry pneumatic drilling. Unquestionably, intestinal absorption must occur since part of the inhaled dust is subsequently coughed up and swallowed, and the drinking water available at the place of work is frequently contaminated with manganese dust. From the observations of Flinn[3] the lungs may be expected to show manganese concentrations eight times that found in the liver and intestines; while the kidneys accumulate still less, and the brain, in spite of its being the principal site of damage, shows the lowest concentration of all.

Most of the manganese reaching the liver is excreted in the bile and eliminated in the feces. A lesser proportion is subsequently removed from the blood stream by the kidneys and is eliminated in the urine. Although cirrhosis of the liver has been experimentally produced, observations in man have not shown a greater frequency of hepatic disease in association with cases of man-

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ganism than is found in the general population.

That airborne and inhaled manganese dust represents the principal hazard is established by the observations that the time of onset of manganism is inversely related to the concentration in air of the agent, and that, in rough terms, the severity of the disease is apt to be directly related to this concentration. In Ansola's experience[1] the pre-symptomatic exposure periods averaged six months, and in Rodier's[5] the average was less than two years with a range of one month to 10 years. The average of exposure times in our cases was about eight years with a range of nine months to 16 years. Flinn,[3] reporting cases from a mill where the atmospheric concentrations ranged from 10 to 173 mg./M^3, found exposure durations resembling ours: an average of 5.6 years with a range from less than one to 15 years.

The variability of time exposure required in our cases to develop the disease may be explained on the basis of frequent changes in jobs and in the material being mined, as well as by variations in the natural ventilation which in turn resulted in fluctuations in concentrations of airborne manganese dust. Because of these variations it has been impossible to calculate the times of exposure to specific dust concentration values; and for this reason we are precluded from making a contribution to the understanding of the M.A.C. for manganese.

At the clinical level, we can present the observations that cortical symptoms occur with greatest frequency among workers exposed to the highest concentrations of manganese dust, and that, contrary to the published observations of others, alcoholism plays an insignificant role in the development of manganism, if indeed there be any relationship at all. Individual susceptibility, although possible, was not evident in the present cases, nor could differences in toxicity among different ores be discerned. There has been some consideration that latent manganism may become clinically manifest in the presence of an infectious disease. This seemed to have been so in five of the cases reported by Ansola, one of these being associated with infectious hepatitis. The association of infectious disease and manganism occurred in only one of our cases, this too being an instance of infectious hepatitis. The association of pneumonia, suggested in the literature of other countries, was not noted in our experience.

Summary

1. THIS STUDY was made at a manganese mine whose main product is pyrolusite (MnO_2). The mining methods in use were primitive, natural ventilation was poor, and mechanical ventilation was unavailable; all of which resulted in high manganese exposures.

2. Of 39 air samples taken, four were in the range of the M.A.C. (6 mg. Mn/M^3 air), 22 were below, and 13 were above this value. The wide variations in air concentrations are due to changes in the nature of the ore encountered and to changes in the natural ventilation. Although the data do not permit a reasonably good estimation of the integrated dose of any person studied, it may be stated that the exposure of these miners frequently exceeded the M.A.C. value. Drillers had the heaviest exposures.

3. Fifteen cases of manganese poisoning were chosen for the detailed analysis of the clinical syndrome presented in this report.

4. There is no correlation between the development of these cases and the ages of the involved miners. The average time of exposure was eight years and two months, with a minimum of nine months and a maximum of 16 years. Particular attention was paid to the possible correlation of a history of alcoholism with the development of manganese poisoning; no such correlation was found in these cases.

5. The psychomotor symptoms experienced by these persons, together with the percentage of cases in which each symptom occurred, were as follows: emotional instability, 53%; apathy, 47%; hallucinations, 40%; flight of ideas, 33%; compulsory acts, 33%; and verbosity, 27%.

6. Neurological symptoms occurred with varying frequencies, as follows: asthenia and adynamia, 93%; sialorrhea, 87%; fatigability, 87%; cephalalgia, 80%; disturbances of sleep, 80%; muscle pains, 67%; paresthesias, 60%; diaphoresis, 40%; disturbances of speech, 33%; disturbances of libido, 27%; and disturbances of ejaculation, 20%.

7. The outstanding neurological signs, together with the percentage of cases in which each sign occurred, were as follows: muscular hypertonia, 87%; expressionless (mask-like) face, 67%; gait changes, 67%; monotonous voice, 47%; tremor of upper extremities, 47%; tremor of lower extremities, 40%; superficial sensory disturbances, 27%; deep sensory disturbances, 20%; impaired hearing, 20%; postural changes, 13%; diplopia, 13%; and pyramidal signs, 13%. Instances of the use of small script in handwriting (micrographia) were noted.

8. The single, noncentral nervous system change of significance noted was an apparent widening of retinal veins on fundoscopy.

Resumen

1. EL mineral donde se efectuó el estudio es un yacimiento de manganeso donde se explota de preferencia el bióxido, pirolucita (M_nO_2). Los procedimientos de extracción empleados son primitivos y por su característica agravan el riesgo de exposición al polvo de manganeso, aunque sin

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llegar al grado de contaminación producido por la perforación neumática en seco, que se ensayó una vez. Las condiciones de ventilación natural son muy deficientes y no existe ventilación mecánica.

2. Se tomaron 39 muestras ambientales de las cuales cuatro están situadas en el rango del C.M.P., 22 por debajo de ella y 13 la sobrepasan. Las variaciones de los valores encontrados se deben a los cambios frecuentes del material trabajado y a las variaciones de ventilación. Estas variaciones no permiten determinar con exactitud la exposición integrada para cada individuo, pero si autorizan a afirmar que en el ambiente de la mina existe una marcada contaminación a manganeso que excede en ocasiones la cantidad máxima permisible.

3. Se practica un estudio médico de 15 casos de intoxicación por manganeso procedentes de esta mina de manganeso.

4. No se demuestra influencia de la edad sobre la patogenia de la enfermedad. El término medio de exposición fué ocho años dos meses, con un mínimo de nueve meses y un máximo de 16 años. Los oficios más expuestos fueron los de barreteros y perforistas. No se comprueba influencia del alcoholismo sobre la intoxicación por manganeso.

5. La sintomatología subjetiva de tipo psicomotor fué: Inestabilidad emocional, 53% ; apatía, 47% ; alucinaciones, 40% ; fuga de ideas, 33% ; actos impulsivos, 33% y verbosidad, 27%.

6. La sintomatología subjetiva de tipo neurológico fué: Astenia y adinamia, 93% ; sialorrea, 87% ; fatigabilidad, 87% ; cefalea, 80% ; trastornos del sueño, 80% ; dolores musculares, 67% ; parestesias, 60% ; diaforesis, 40% ; alteraciones de la voz, 33% ; alteraciones de la líbido, 27% y alteraciones de la eyaculación, 20%.

7. En el examen neurológico se destacan: Hipertonía muscular, 87% ; rigidez de la cara (en máscara), 67% ; alteraciones de la marcha, 67% ; voz monótona, 47% ; temblor de las extremidades superiores, 47% ; temblor de las extremidades inferiores, 40% ; alteraciones de la sensibilidad superficial, 37% ; alteraciones de la sensibilidad profunda, 20% ; sordera, 20% ; cambios posturales, 13% ; diplopia, 13% y signos piramidales, 13%. Además fué observada escritura con tendencia a la micrografía.

8. En algunos casos fué observado un aparente ensanchamiento de las venas en el fondo de ojo.

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Dermatitis

American Soap and Glycerine Producers, Inc., surveyed 141 plants with 429,000 employees and concluded that the best method of combating skin disease is through education of employees on how to recognize its causes and how to prevent it before it occurs. Methods rated most effective are, in order, plant posters, washroom decals, and employee leaflets. A high incidence of dermatitis continues despite the facts that almost all companies provide soap, skin cleansers and towels; more than two-thirds provide showers, protective clothing, protective creams and ointments; 93% reported that employees used these facilities regularly. Company-paid cleanup time is provided by 82% of firms. Dermatitis costs industry at least $100 million annually. Survey disclosed that 26% of employees in manufacturing industries face exposure to potential skin irritants; at least 9% actually contract some form of skin disease that results in lost man-hours; small industry loses most man-hours because of dermatitis. In plants employing 500 or fewer, 36% of employees are exposed to skin irritants. Yet of these plants, 84% did not provide educational programs on cleanliness. Lost man-hours totaled 18,219 in 1955 among 59 companies able to supply information. Analysis indicated that figure should be much higher, since many companies did not know extent of dermatitis problem or amount of lost time it incurred. Oils, greases, chemicals, solvents, acids, alkalis, and cleaning agents -- in that order — comprise nearly 60% of potential irritants. Production and processing departments were listed as work areas with highest irritation potential. Employees are most likely to suffer skin irritants within first 30 days on job, indicating necessity for educating new workers on proper preventive measures and cleanup techniques.

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The Surgeon and the Adrenals

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THE SURGEON is concerned with the adrenals in two ways: (1) he uses preparations of adrenal steroids or medullary extracts in preoperative and postoperative care, and (2) he attacks the adrenals surgically. Only the highlights of the latter aspect of the relationship will be considered.

Four disorders of adrenal function or structure may require a surgeon's assistance in their diagnosis and/or treatment. These are pheochromocytoma, Cushing's syndrome, the adrenogenital syndrome, and aldosteronism. All of these are regarded as rare disorders. This concept may turn out to be erroneous. Its correction may depend on two things: (1) an increasing index of suspicion on the part of the profession generally, and (2) less reluctance in asking the surgeon to explore these organs when we are in doubt. These disorders will be discussed briefly and the difficulties of diagnosis and treatment pointed out. A few case reports are included to illustrate some features of the problem. In addition, brief reference will be made to conditions for which adrenalectomy is offered as a palliative measure.

The combined weight of the two adrenals is 10-15 grams, a little less than half an ounce. It is estimated that seven-and-a-half times their weight in blood courses through them every minute.[1] The medulla secretes two hormones—epinephrine and norepinephrine. From the cortex, 30 odd hormones have been isolated. Probably not more than half a dozen have significant physiologic activity. All are known as steroid hormones—that is, they have as their base the steroid nucleus. This consists of four condensed carbon rings—three of six carbon atoms, and one of five.[2] These are numbered empirically one to four. Three are set at an angle to each other like the base of a honeycomb. Actually, the five-carbon ring, ring IV, is the only one which may be regarded as lying in the same plane as that of a diagram shown on a printed page. Each carbon atom in the four rings is numbered separately from one to 17. The character of the groups attached to the carbon atoms at the diametrically opposite ends of the steroid molecule determines the physiological character of that steroid. The carbon atoms at these opposite ends are numbered three and 17 respectively. Certain steroids are designated by a number representing the carbon atom to which a characteristic group is attached followed by the name of that group.

Pheochromocytomas are tumors of the medulla or of similar tissue located elsewhere in the body. While only about 200 cases are said to have been reported, it is estimated that tumors of this type cause about 700 deaths annually.[3]

These tumors lead to paroxysmal attacks characterized by palpitation, tachycardia, tremor of the extremities and head, sweating, weakness, vertigo, headache, anxiety, nausea, vomiting, diarrhea, circumoral pallor, blurred vision, paroxysmal hypertension (which becomes permanent in two-thirds of the cases), and transient glycosuria. These attacks may occur frequently or after long intervals. They may be precipitated by pressure, as during physical examination, by massage over the kidney region, by emotion, by hypoglycemia, and by certain drugs.

The diagnosis depends on the history and physical findings as already indicated, and a few tests. A diabetic type of sugar curve and glycosuria may be found during, or soon after, an attack.

Provocative Tests[4a]

HISTAMINE PHOSPHATE quickly given intravenously in a dose of 0.01 to 0.05 mg. causes a significant, sometimes alarming, increase in blood pressure. When this occurs Regitine 5 mg. should be given intravenously. In normal persons histamine phosphate causes a slight fall in blood pressure. False positive tests do occur. This test probably should not be used outside a hospital, nor given to patients with allergy.

Mecholyl 12.5 to 25 mg., given subcutaneously, causes a slight rise in blood pressure in normal persons but a considerable rise in victims of pheochromocytoma. False-positive and false-negative tests are reported.

Regitine 5 mg. given intravenously over a one-minute period causes a drop of about 35 mm. in systolic pressure and 25 mm. in the diastolic. This test, to be of any value, must be given when the patient is showing significant hypertension. False positive reactions are said to be uncommon. Some writers[5] feel that when the blood pressure is below 170/110 histamine may be used,

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but if it is above these figures Regitine should be used.

Certain precautions should be taken before any of these tests are done. The patient should have had no sedatives or narcotics for 48 hours. Basal blood pressures should be obtained for 30 minutes. The cold pressor test should be carried out and basal blood pressure obtained afterward before any injections are given.

To be regarded as positive, the histamine injection should be followed within two minutes by a rise in blood pressure greater than that occasioned by the cold pressor test.[5]

Determination of the urinary catecholamines is important. Unfortunately, few laboratories do it. We have been fortunate to have Dr. O. M. Helmer make these determinations for us.

The x-ray may help, as in Cushing's disease.

Pheochromocytoma must be differentiated from hyperthyroidism and anxiety states.

Treatment is surgical removal of the tumor. This is usually unilateral, but in about 16% of the cases it is bilateral or extends around the aorta in horseshoe fashion.[4a] Many persons have accessory adrenal tissue.

While waiting for operation, the situation may be controlled by Regitine 50 mg. orally every three to six hours, or 5 mg. intramuscularly every three to four hours.

During the surgical procedure the patient's life is in serious danger at two points: (1) A dangerous rise in blood pressure may occur during the induction of anesthesia, or when handling the tumor. This may be prevented or minimized by the slow intravenous infusion of 25 mg. of Regitine in 500 cc. of 5% dextrose in water. The rate of flow should be gauged by the blood pressure. (2) Immediately after removal of the tumor, a sudden fall in blood pressure may occur unless sufficient vasopressors are administered quickly. About the time the tumor is removed a rapid intravenous infusion of the following solution should be given: 500 cc. of 5% dextrose in water with (1) either 4 mg. of nor-epinephrin hydrochloride, or 5 mg. of Neo-Synephrine, or 10 mg. of Vasoxyl, plus (2) 100 mg. of hydrocortisone. The doses of vasoconstrictors may be doubled or tripled if needed. The dose of hydrocortisone should not exceed 200 mg. per 24 hours. Following the operation, in over 50% of the cases the blood pressure returns to normal and the other metabolic abnormalities are likely to clear up.[4a]

Cushing's Syndrome

CUSHING[6] originally reported this syndrome as one of "pituitary basophilism." It has been found in connection with a number of conditions, but it is now generally admitted that the syndrome does not occur except in the presence of excessive amounts of some of the adrenal cortical hormones. These hormones may come from adrenals which are normal in size and appearance, or are hyperplastic, or are the site of adenoma or carcinoma. We are not certain what causes the adrenal disturbance. It may be due to a basophilic adenoma, to some disturbance in the hypothalamic area, or perhaps to some disturbance within the adrenal itself. Some suggest[7] that the pituitary puts out a corticotropic potentiating hormone which causes the trouble. The syndrome may begin during pregnancy or soon after delivery. There is some reason for believing that it may follow, if not be caused by, prolonged mental strain.

This syndrome may not be as rare as is generally thought. Females are attacked more frequently than males, the ratio being about five to one.[4b] It sometimes shows spontaneous remissions, but usually pursues a steadily downward course.

The following symptoms and signs were tabulated in 222 patients with Cushing's syndrome:[4c]

Obesity	97. %
Hypertension	84.5
Oligomenorrhea and impotence in men	78.5
Hirsutism	71.
Plethoric appearance	69.5
Weakness and backache	66.5
Purple striae	65.5
Acne, skin pigmentation, or other rash	54.
Mental symptoms	49.
Headache	46.
Ankle edema	44.
Purpura or easy bruisability	41.5
Poor wound healing or severe infection	36.
Polydipsia or polyuria	32.
Neurologic symptoms or signs	28.
Virilism	7.
Exophthalmos	7.

The diagnosis is based on the history and physical findings enumerated—the rapidly acquired, peculiarly disposed obesity being limited mostly to the face and trunk with a cervical fat pad or "buffalo hump"; the purplish striae on the abdomen, breasts, inner aspect of the upper arms, the groin and lower back. The ruddy, moon-shaped face is sometimes so full as to conceal the ears when one stands directly in front of the patient.

The laboratory data include an increase in hemoglobin and red blood cells, decrease in lymphocytes with corresponding increase in polynuclears and the hematocrit, reduction in the number of eosinophils, and a diabetic type of sugar curve. Determination of the urinary output of the 17-ketosteroids and total corticoids is helpful. Not many laboratories are equipped to do this. We have been fortunate in having the services of Dr. J. J. Gold and his laboratory. If the output is at or near the upper limits of normal, an eight-hour intravenous ACTH infusion will sometimes show a great increase in the steroid output, particularly the total corticoids. There is

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a greater increase in cases of bilateral hyperplasia than with adenoma. There may be no increase in cases of cancer.

An intravenous pyelogram and flat plate of the abdomen may occasionally show a mass or other distortion about a kidney. Later, osteoporosis may be seen.

Perirenal or presacral insufflation of oxygen are procedures enthusiastically used by some and viewed with disfavor by others. Our own feeling is that there are few arguments in favor of these procedures and many objections. They carry some risk and may give no information, or even false information. Our feeling is that there is no more risk in exploratory operation, and that by this procedure we can not only be certain as to the state of the adrenals but can correct the situation at the same time.

Treatment

ANY ONE of several procedures may be followed. The one selected in any individual case will depend ultimately on two factors: (1) the severity of the disease and whether it is progressing rapidly; or (2) how far one wishes to go in deciding the state of the adrenals, i.e., whether they are normal in size and appearance, hyperplastic, adenomatous, or the seat of a tumor.

If the disease is mild and progressing slowly, the physician may feel that he can rely on the laboratory and x-ray findings to rule out tumor or enlargement. In that case, he could irradiate the pituitary and give the patient estrogens cyclically, i.e., moderately heavy doses three weeks out of each month for three months. Some cases have been relieved at least temporarily by this program.

Dohan, *et al*[8] are of the opinion that where an adrenocortical tumor is not present, a relatively low total roentgen dose delivered at a high average daily increment will be effective in a considerable percentage of cases.

If catabolic effects are prominent features, testosterone or methyl testosterone 10 mg., t.i.d. will overcome some of the unpleasant effects of the disease.

If, however, the physician feels that the patient is sick enough, or that the disease is progressing rapidly, he will wish to explore the adrenals. This seems particularly true in view of the fact that adenomata too small to be demonstrated by any method except exploratory operation can cause this syndrome. When exploratory operation is decided upon, the patient should be prepared as for partial or total adrenalectomy. Cortisone or hydrocortisone should be given in adequate doses before the operation. Various schedules are advised. Hydrocortisone 100 mg. in 1000 cc. of 5% dextrose in saline should be given intravenously during and for six to 12 hours after the operation. During the postoperative periods these hormones should be given in decreasing doses as needed.

If an adenoma or carcinoma is found, the tumor and the adrenal should be removed. If only hyperplastic or normal-appearing adrenals are found, some adrenal tissue should be removed. The amount will depend on the judgment of the surgeon and the endocrinologist, who should be in attendance. The adrenals should be seen and not merely palpated. The situation is like that in Graves' disease—if a sufficient mass of adrenal tissue is removed, a cure or satisfactory remission occurs. It appears that one adrenal and perhaps 90% of the other should be removed. If the case is progressing rapidly, some men prefer total bilateral adrenalectomy. They then treat the case as one of Addison's disease where the correct dose of hormone easily can be determined. The adrenals have great regenerative capacity. If an insufficient amount is removed, the remnant may hypertrophy and reactivate the syndrome. On the other hand, the remnant may atrophy, the patient being precipitated into Addison crisis before realizing anything has gone wrong.

Partial adrenalectomy followed by irradiation of the pituitary is said to bring remissions in over half of the cases.[9]

The decision as to the treatment is not an easy one.

A few case reports illustrate some of the complexities of the problem.

A 34 year old woman[11] complained of obesity, menorrhagia, backache, swelling of feet and ankles, and shortness of breath. Her periods began at age 10 and were regular and normal to age 31, when she began to skip periods and then flow from 30 to 70 days. She had been thin until age 11, gained steadily after that, but her most rapid gain occurred after a miscarriage at age 30. The onset of Cushing's syndrome may occur with pregnancy or soon after delivery.

She was 5 ft., 2 in. in height and weighed 191 pounds. The obesity was largely confined to her face and trunk. There were a few pale striae about the lower abdomen. Blood pressure was 140/100 when first seen, but was later as high as 180/110, usually averaging 160/100.

Laboratory data: RBC 3,900,000; WBC 8,600; polys 82; lymphs 14. Glucose tolerance test showed a diabetic type of curve with glycosuria. The x-ray showed a suspicious shadow above the left kidney. The 17-ketosteroids and corticoids were normal before and after ACTH infusion.

Medical treatment had little effect. At exploration an adenoma was removed with the left adrenal.

The results were spectacular. She lost 51 pounds. The periods became regular and normal, and the blood pressure became normal. The glucose tolerance test returned to normal. Her face

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lost its roundness and ruddy color so that friends scarcely recognized her.

A 15 year old girl[11] seen in November, 1952, complained of obesity, which had increased rapidly in the previous six months; hirsutism, which had also begun six months before; amenorrhea of three months' duration; and frequent headaches. She was under great emotional and physical strain and was poorly adjusted to her environment. A psychiatrist had given her shock therapy without benefit.

She was 5 ft., 3 in. in height and weighed 192 pounds. The obesity was largely confined to her face and trunk. The cervicodorsal hump was not marked. Her hair was coarse with excess on her back, chest, and abdomen, with male type of escutcheon. Her face was round and ruddy with a great deal of acne. Many purplish striae were present on the breasts, abdomen and thighs.

After an exhaustive study elsewhere it was decided that no organic endocrinopathy was present and that she needed psychiatric counseling. On this regime and dietary restrictions she made satisfactory progress. She lost 50 pounds in weight, her periods became regular, the acne improved greatly, she became well-adjusted and secured and held a responsible position.

In October, 1956, she again came under observation. She had recently gained weight and the hair growth had increased. The striae were present but pale. The physical examination was not otherwise significant.

The blood count showed polys 65 and lymphs 25. The sugar tolerance test was normal. The 17-ketosteroids were reported as follows:

November 12,	1952	18.8 mg./24 hr.
December	1952	14.2 mg./24 hr.
		14.6 mg./24 hr.
October	1956	12.5 mg./24 hr.
total corticoids		6.42 mg./24 hr.
pregnanediol		16.73 mg./24 hr.

After eight-hour intravenous infusion of 25 units ACTH

total corticoids	22.6 mg./per 24 hrs.
17-ketosteroids	17.5 mg./per 24 hrs.

The adrenals were explored by Dr. Chester C. Guy via the abdominal route. The right ovary was cystic and slightly enlarged. The right adrenal was normal size. The left was at least twice normal size and showed adenomatous hyperplasia. One half of the right, and two thirds of the left adrenal were removed. Following the operation the pituitary was irradiated. She is improving slowly. Some of the excess hair is being lost.

The adrenogenital syndrome is due to an excessive production of androgens, usually from the adrenal cortex but sometimes from the ovary. The most attractive theory is that the adrenals have lost their ability to convert 17-hydroxy progesterone to 17-hydroxy cortisone. The former thus accumulates in excess quantities and causes the virilization.

Onset during intrauterine life causes pseudohermaphroditism; onset in childhood leads to precocious somatic and sexual development with early closure of the epiphyseal lines. The child may be tall for her age but reaches adult years shorter than average. Onset in adult life is characterized by signs of virilism with few signs of the metabolic disturbances seen in Cushing's syndrome. The hair grows excessively with male type of distribution including a beard and mustache. The voice deepens; the Adams apple becomes more prominent; menstruation becomes infrequent or ceases; the clitoris hypertrophies; the breasts tend to atrophy; muscular strength and endurance increase.

The same diagnostic procedures are available as in Cushing's syndrome. There is less likely to be a diabetic type of sugar curve and hypertension occurs less frequently. The 17-ketosteroid output is more often quite high.

A condition from which this must be differentiated is the Stein-Leventhal syndrome caused by polycystic ovaries. Again it may be necessary to resort to exploratory laparotomy to be certain of the underlying cause.

However, a simpler method that may be tried temporarily is to give the patient hydrocortisone or cortisone in doses sufficient to depress the 17-ketosteroids in the urine. The dose of cortisone in adults is 50 to 100 mg. per day for usually about two weeks, then 25 mg. every fourth day in the young and 100 mg. every fourth day in the older age group. Oral therapy is also effective but larger doses are required. Hydrocortisone 250 mg. intramuscularly every seven to 10 days is reported as satisfactory in some cases; i.e., menses are restored to normal, the breasts return to normal size, the excess hair may or may not disappear. Treatment will need to be carried on over a considerable time—a year or so. Patients with polycystic ovaries respond to this treatment in much the same manner as those with the adrenogenital syndrome.

Unfortunately, the signs of Cushing's syndrome and the adrenogenital syndrome are likely to overlap. To repeat, ovarian tumors too small to be palpated and adrenals which cannot be demonstrated may be sufficient to cause the syndrome. There is also the possibility that polycystic ovaries and hyperfunction of the adrenal cortex occur in the same patient so that both the ovaries and the adrenals should be investigated during the exploratory procedure. The adrenals should be seen as well as felt.

A 22 year old woman complained that for the last six months, the intervals between her periods had been too long. Hair was increasing over the sternum and on the inner aspects of the thighs. She was of the opinion it was growing rapidly.

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She had hay fever in early spring and in August. The previous and family history provided no helpful data.

She was 5 ft., 3 in. in height and weighed 105 pounds. The hair on her head was blonde but there was considerable black coarse hair between the breasts and on the thighs. The pubic hair was of the male pattern. There was some excess on arms and legs. The B.M.R. and blood chemistry was normal. The blood count showed polys, 74; lymphs, 19; eosinophils, 4. Total corticoids 3.32 mg./24 hrs. before and 9.54 mg./hrs. after ACTH infusion; 17-ketosteroids 17.4 mg./24 hrs. The basal body temperature chart raised the question of whether she was experiencing ovulation.

She was given cortisone 12.5 mg. twice daily and estinyl .02 mg. once a day. This small dose was given because she could not be kept under observation and contact was by mail only. Her temperature chart looked more nearly normal within three weeks after the medication was started. If pregnancy does not occur in about 90 days from the time cortisone was started, she expects to have an exploratory operation.

Aldosteronism is another example of adrenal hyperfunction. Only a few cases have been reported. Diagnosis is more difficult than in other examples of adrenal disorder. One should think of it when confronted with a patient who has hypertension and weak spells and whose electrocardiogram shows a suspicion of hypopotassemia. If, in addition, the potassium is three or below, it is likely the patient has aldosteronism and an exploratory operation should be done. Treatment consists of surgical removal of the adrenal tumor.

Subtotal and total bilateral adrenalectomy has been done for hypertension. It is said that 20-25% of patients have benefited objectively from bilateral adrenalectomy.[4e] Subjective improvement is reported in another 25%. A combination of subtotal adrenalectomy and partial sympathectomy (T-11 through L-2) is said to produce results comparable to those following bilateral adrenalectomy.[4e]

Total bilateral adrenalectomy is done for palliative relief of metastatic cancer of the breast and prostate. It still can be considered an experimental procedure. Baker[10] says that he regards intractable pain as the only indication for adrenalectomy in cases of prostatic cancer.

Summary

HYPERFUNCTION of the adrenal medulla causes one syndrome. It is difficult to recognize with certainty. The treatment is purely surgical.

Hyperfunction of the adrenal cortex may give rise to three different syndromes, depending probably on which hormones are in excess and on the age at onset.

In Cushing's syndrome the metabolic effects are most prominent. The corticoids are probably produced in excess and the 17-ketosteroids normal or only slightly increased. The diagnosis in well developed cases can be made on clinical grounds.

The adrenogenital syndrome is due to an excess of androgenic steroids. The responsibility for either condition is often determined by exploratory operation.

Aldosteronism is a syndrome of which only a few cases have been reported. The diagnosis would depend finally on finding an excess of aldosterone in the urine or by exploration. Treatment is strictly surgical.

Selection of treatment for either Cushing's syndrome or the adrenogenital syndrome presents a difficult problem. Whatever is done may not be wholly satisfactory to patient or physician.

(59 East Madison)

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Oscillograph

PRE-EMPLOYMENT evaluation of physical capabilities by oscillograph aids in placement. Machine, recently installed by Texas Division, Dow Chemical Company, measures electrical and mechanical activities of heart and other parts of body, helps company decide if employee can do jobs involving consistent physical labor or if he should be confined to desk work. —From *Industrial Relations News*, February 9, 1957.

Maintaining Emotional Health

MENNINGER FOUNDATION SEMINAR FOR INDUSTRIAL PHYSICIANS

Reported by HARRY LEVINSON, Ph.D., Director
Division of Industrial Mental Health, Menninger Foundation
Topeka, Kansas

THE SECOND annual Menninger Foundation Seminar for Industrial Physicians, entitled "Maintaining Emotional Health," was held March 4-8, in Topeka. Conducted much along the same lines as the first Seminar (*Indust. Med. & Surg.*, 25:4, 177 (April) 1956), the present one was concerned with the practical application of psychiatric knowledge and skills in industrial medicine. The faculty was composed of members of the staffs of the Menninger Foundation, Topeka State Hospital, and the Winter VA Hospital.

William C. Menninger, M.D., began the Seminar with the presentation of "Principles of Psychiatry Applicable to Industrial Medicine." This was followed by a four-lecture unit on "Motivation." The lecturers were Lewis L. Robbins, M.D., Karl Menninger, M.D., Herbert C. Modlin, M.D., and Robert Wallerstein, M.D., all of the Menninger Foundation staff. Their individual lectures, under the unit heading, were "Conscious and Unconscious Motivation," "Constructive and Destructive Personality Trends," "Personality Mechanisms," and "Mind and Body." Each lecture was followed by a discussion period with the lecturer, ranging from 45 minutes to an hour-and-a-half. The Veterans Administration film, "Psychotherapeutic Interviewing," was shown and a discussion was led by Prescott Thompson, M.D.

AS THE GUESTS of Winter VA Hospital, the Seminar participants heard two lectures, one on "The Doctor-Patient Relationship" by Arthur McMahon Jr., M.D., and the other on "Brief Screening Methods" by Donald Hammersley, M.D. Each of these lectures was followed by a demonstration, observed by the Seminar participants through a one-way vision screen, and followed by discussion. William Simpson, M.D., and Howard Williams, M.D., then presented the sub-

Front row (left to right): Harry Levinson, Douglas B. Wilson, Edna R. Thompson, Julius A. Vogel, Raymond B. Nutter, John F. Shronts, Adelaide Romaine, Marion D. Wygant, Richard C. Boelkins, W. Daggett Norwood, Charlton R. Price. Second row (left to right): Walter R. Thayer, Robert P. Jessup, James W. Osborn, Michael A. Young, Roland F. Shirley, Howard H. Smead, Robert C. Thompson, George E. McGlothlen, Paul F. Emery, Jerome Ellman, William C. Menninger, John T. Jarrett, Edward J. Tracy, D. E. Billman.

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Left to right: George E. McGlothlen, Jerome Ellman, Walter R. Thayer, Edward J. Tracy, Robert P. Jessup, James W. Osborn, Robert C. Thompson, Roland F.. Shirley, W. Daggett Norwood, Herbert C. Modlin.

Left to right: Edna R. Thompson, Adelaide Romaine, D. E. Billman, Michael A. Young, Richard C. Boelkins, Julius A. Vogel, Raymond B. Nutter.

ject "Psychiatric Case Study" at the Topeka State Hospital. These three lectures comprised the unit on "Principles of Psychiatric Examination."

Paul Feldman, M.D., of the Topeka State Hospital staff, then summarized "Somatic Treatment Methods in Psychiatry" with special emphasis on the current status of the ataractic drugs. Arthur Leader, Chief of Social Service at Winter Hospital, discussed "Rehabilitation of the Psychiatric Patient." Dr. Robbins presented "Principles of and Criteria for Psychotherapy," and Dr. Williams concluded the formal part of the meeting with "Brief Psychotherapy for Industrial Physicians."

There were three evening lectures. Dr. George S. Rhodes, Chief of Vocational Counseling Service at Winter Hospital, discussed "Psychological Tests—Their Values and Limitations." John A. Segerson, M.D., of the Menninger Foundation staff, on the second evening spoke on "Certain Neurologic Symptoms in Ambulatory Individuals." On the third evening, Dr. Modlin's lecture subject was "Traumatic Neurosis."

Dr. Karl Menninger, Alfred P. Bay, M.D., Superintendent of the Topeka State Hospital, and Dr. R. C. Anderson, Manager of the Winter VA Hospital, spoke at the Thursday evening dinner for seminar participants, members of the faculty, and their wives. Guest speaker was Hubert W. Smith, M.D., Director of the Law-Science Institute of the University of Texas, a physician and attorney whose special interest is legal medicine.

THE PARTICIPANTS in the seminar were: D. E. Billman, M.D., Medical Director, Corning Glass Works, Corning, New York; Richard C. Boelkins, M.D., Medical Director, American Seating Company, Grand Rapids, Michigan; Jerome Ellman, M.D., Examining Physician, Illinois Bell Telephone Company, Chicago; Paul F. Emery, M.D., Clinician, Socony Mobil Oil Company, Inc., New York City; John T. Jarrett, M.D., Medical Officer, the Chesapeake and Potomac Telephone Company of West Virginia, Charleston, West Virginia; Robert P. Jessup, M.D., Associate Medical Director, Sperry Gyroscope Company, Great Neck, New York; George E. McGlothlen, M.D., Medical Supervisor, E. I. du Pont de Nemours and Company, Victoria, Texas; W. Daggett Norwood, M.D., Manager—Health and Safety Operation, General Electric Company, Richland, Washington; Raymond B. Nutter, M.D., Supervising Physician, General Electric Company, Erie, Pennsylvania; James W. Osborn, M.D., Medical Director, Standard Oil Company, Cleveland, Ohio; Adelaide Romaine, M.D., Medical Director, Federal Reserve Bank of New York, New York City; Roland F. Shirley, M.D., Industrial Medical Specialist, General Electric Company, Evendale, Ohio; John F. Shronts, M.D., Medical Director, General Mills, Inc., Minneapolis, Minnesota; Howard H. Smead, M.D., Medical Director, Solar Aircraft Company, Des Moines, Iowa; Walter R. Thayer, M.D., Associate Physician, Employee Health Services, National Institutes of

Left to right: Richard C. Boelkins, Julius A. Vogel, Raymond B. Nutter, Douglas B. Wilson, John F. Shronts, Howard H. Smead, Charlton R. Price, John T. Jarrett, Marion D. Wygant, George E. McGlothlen, Jerome Ellman, Walter R. Thayer (face hidden), Edward J. Tracy, Robert P. Jessup.

Left to right: John F. Shronts, Howard H. Smead, John T. Jarrett, Marion T. Wygant.

Health, Bethesda, Maryland; Edna R. Thompson, M.D., Senior Staff Physician, American Telephone and Telegraph Company, New York City; Robert C. Thompson, M.D., Manager—Health and Hygiene, General Electric Company, Lynn, Massachusetts; Edward J. Tracy, Brig. Gen., USAF (MC), Command Surgeon, Air Materiel Command, United States Air Force, Wright-Patterson Air Force Base, Ohio; Julius A. Vogel, M.D., Works Physician, Jones & Laughlin Steel Corporation, Aliquippa, Pennsylvania; Douglas B. Wilson, M.D., Medical Director, Employee Health Service, Department of Health, Education, and Welfare, Social Security Administration, Bureau of Old-Age & Survivors Insurance, Baltimore; Marion D. Wygant, M.D., Plant Physician, Dodge Manufacturing Company, Mishawaka, Indiana; and Michael A. Young, M.D., Assistant Medical Director, Royal Typewriter Company, Hartford, Connecticut.

SPECIAL guests of the seminar were: Lyle M. Spencer, President, Science Research Associates, Chicago, and Chairman of the Committee on Industrial Mental Health, the Menninger Foundation; Harold Steinberg, M.D., Assistant Medical Director, International Harvester Company, Chicago; and Gardner Murphy, Ph.D., Director of Research, the Menninger Foundation. Drs. Murphy and Steinberg are consultants to the Committee on Industrial Mental Health of the Menninger Foundation Board of Governors. Other guests: David Neiswanger, President, Neiswanger Company, Inc., Topeka, and President, the Menninger Foundation, and Nathaniel Uhr, M.D., Internist, the Menninger Foundation.

Older Workers

OVER-ALL performance . . . . Most older employees do as well or better than younger workers. A National Association of Manufacturers survey of 2,500,000 employees rated 23% of older workers superior, 70% equal, and only 7% not equal to younger workers. Absenteeism . . . . Older people do better. A University of Illinois study of 3,000 employees revealed that 66% of workers over 60 years old had fewer absences than younger ones. Only 9% were absent more often. Dependability . . . . The University of Illinois study rated 51% of older workers more dependable than younger people and 43% about the same. Safety . . . . Records show that older workers have no more accidents and sometimes have fewer than other workers. In a study of 17,800 manufacturing employees, workers over 45 had 2.5% fewer disabling accidents and 25% fewer nondisabling injuries than younger people. Work quality . . . . According to the University of Illinois survey 34% of the older employees turned out better work than their younger colleagues; 59% turned out the same quality of work, and 7% produced work of a poorer quality. Volume . . . . In the University of Illinois report 24% of the older workers produced more work than their younger co-workers, 56% produced the same amount and 20% produced less. Getting along with others . . . . In the University of Illinois survey, supervisors rated 32% of the older people higher than young workers, 59% about the same, and 9% lower. The Department of Labor report says that older employees tend to have a stabilizing effect on other workers. One employer, recognizing this, said he would like to have at least one older person in every working group to create what he called unconscious supervision. Usefulness of any worker depends, of course, on the type of job involved. The main effort of government officials is to convince employers that age limitations as such are meaningless. Good hiring policy dictates that each applicant be judged on his individual merits.

—From *New York World-Telegram*, December 29, 1956.

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Occupational Potentialities of Patients with Congestive Heart Failure

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THE IDEA that persons having heart disease are able to work, and that they can be employed in a variety of jobs, is by no means new. A recent review[1] of the subject summarizes a number of articles on employment and heart disease going back to the early 1920's and also cites a number of more recent studies.

In spite of a rather voluminous literature, there has rarely been any mention of the employability of individuals having congestive heart failure. There are, however, a few such references. At a clinical conference conducted by the late Dr. Edgar Durbin[2] the question was raised: "Does an episode of congestive failure preclude future employment?" The answer (by Dr. Durbin) stated that "many people who suffer their first congestive failure can, with various drugs, lead a normal life thereafter for many years." Among the drugs mentioned as being useful are digitalis, ammonium chloride, and mercurial diuretics, both oral and parenteral. In an article published in 1951 by the staff of the Bellevue Work Classification Unit in New York,[3] mention is made of the employment of persons having a cardiac classification of "Class 3 and worse." A number of these patients had had episodes of congestive failure, but no special discussion is devoted to that particular matter. A later article by the same observers[4] mentions the occurrence of congestive heart failure in a number of patients who subsequently returned to work, but no details are given. While it is possible that the literature may contain additional references to the employability of cardiacs in congestive failure, it seems safe to state that this subject has not received much attention. This being the case, there is justification for publishing a few illustrative case histories.

Case Reports

CASE 1, male, age 29.

Diagnosis: Constrictive pericarditis, possible rheumatic heart disease (inactive) with mitral stenosis.

Heart disease first diagnosed: 1951 (age 24).

First congestive failure: June, 1951.

Therapeutic regimen:

Pericardectomy, July, 1951, and November, 1953.

Salt restriction, poorly followed.

Digitalis leaf, 0.1 gm. - 0.2 gm. daily.

Quinidine, 0.6 gm. q.i.d.

Parenteral organomercurials once or twice weekly, 1951, to August, 1954.

Oral organomercurials (neohydrin) started August 1954, at first two tablets daily, later three tablets daily, five days each week.

Dosage varied between 15 and 30 tablets a week. Parenteral organomercurials continued every one to four weeks. Ammonium or potassium chloride 6 gm. daily starting April 1956. Bicillin, 1,200,000 units every four weeks starting in May 1956.

Occupational history: Patient employed as a mechanic at an airport, frequently working overtime with no difficulty in performing his duties. Has had no absences from work except for the two periods of hospitalization for pericardectomies, in spite of bouts of auricular fibrillation about every three months.

Comment: In spite of congestive failure, this patient has continued to pursue his regular work as a mechanic. He has continued to work for more than five years under a therapeutic regimen which includes digitalis, quinidine, ammonium and potassium chloride, Bicillin and organomercurials by mouth and by injection.

CASE 2, female, age 54.

Diagnosis: Rheumatic heart disease, mitral stenosis, aortic insufficiency and stenosis, normal sinus rhythm with intermittent bouts of auricular fibrillation.

Heart disease first diagnosed: 1918 (age 16).

First congestive failure: 1951 (age 49).

Therapeutic regimen:

Prior to June, 1954, was on no strict cardiac therapy, but did receive medication of undetermined nature. Since June, 1954, has had strict

sodium restriction, digitalis leaf 0.1 gm. daily, quinidine 0.2 gm. t.i.d., parenteral organomercurials about once a week, ammonium chloride 4.0 gm. daily, three times a week and multivitamins. Oral organomercurials (neohydrin) started in July, 1954, two tablets daily, five days a week and ammonium chloride increased to 6.0 gm. daily, three times a week. Because of intermittent bouts of nausea and vomiting and of auricular fibrillation the regimen required modification from time to time and on several occasions antibiotics were added.

Occupational history: Patient is a social worker and her job involves considerable travel, both local and out-of-town. Between 1952 and June, 1954, she was away from work for three periods because of cardiac complaints. Since June, 1954, she has had two periods of work absence, one of about six weeks duration due to digitalis toxicity and the other for one month because of suspected rheumatic activity, both episodes being accompanied by congestive failure.

Comment: Although this patient has severe organic heart disease with congestive failure she has been able to carry on an active occupational life for a number of years. Intermittent bouts of cardiac failure have necessitated several periods of hospitalization, but she has returned to work following each of these. Her therapy has included digitalis, quinidine, ammonium chloride, and parenteral and oral organomercurial diuretics.

CASE 3, male, age 64.

Diagnosis: Arteriosclerotic heart disease with coronary sclerosis.

Heart disease first diagnosed: 1947 (age 55).

First congestive failure: December, 1955 (age 63).

Therapeutic regimen:

Low salt diet (1 gm. daily).

Digitalis leaf, 0.1 gm. daily.

Dicumerol.

Potassium chloride 1 gm. four times daily.

Oral organomercurials (neohydrin) two tablets three times a day to four tablets every other day.

Parenteral organomercurials intermittently.

Occupational history: Employed full time as a building inspector, requiring considerable walking and some climbing. Had four recurrences of congestive failure, each relieved by addition of parenteral organomercurials without loss of time from work. Hospitalized for seven days in December, 1955, for thrombophlebitis of right leg and congestive failure.

Comment: Under combined therapy of salt restriction, digitalis, dicumerol, potassium chloride, and oral and parenteral organomercurial diuretics this man has been able to continue successfully at an active occupation.

CASE 4, male, age 66.

Diagnosis: Arteriosclerotic heart disease with coronary sclerosis, chronic bronchitis.

Heart disease first diagnosed: date undetermined.

First congestive failure: August, 1953 (age 63).

Therapeutic regimen:

Digitalis leaf, 0.1 gm. daily.

Low salt diet.

Ammonium chloride 6 to 8 gm. a day, three times a week.

Thiomerin 2 cc. three times a week to once every four weeks.

Bronchodilators p.r.n. (for bronchitis).

Oral organomercurials (neohydrin) two to four tablets daily five times a week.

Occupational history: Prior to retirement in 1955 at age 65, patient worked regularly as a night watchman. After retirement he secured a job as an orderly in a convalescent home but left because he did not like the work. At present he is seeking other employment.

Comment: In spite of his age and severe heart disease, this man worked regularly until he was retired at age 65. Under suitable therapy he felt well enough to seek new employment and is still in the labor market.

Comment

DURING the past decade there has been a decided trend on the part of physicians to be less restrictive when advising their cardiac patients as to physical activity. At the same time, the general public (which includes the patients and their families) have been becoming less apprehensive about the dangers of heart disease. The major efforts in public education, particularly those connected with fund raising, have shifted their emphasis from the "scare" technique to that of pointing out the positive and hopeful aspects. There have been few if any controlled studies of any magnitude to prove that this new approach is justified, but many prominent cardiologists have expressed their belief that properly selected employment is desirable for many if not most cardiacs. One study,[4] somewhat limited in nature, has shown that no adverse effects occur when persons with heart disease are intelligently placed at work and remain under competent medical supervision.

The changing attitudes of the medical profession and of the public is only one of the important recent advances in cardiology. Refinements in diagnostic procedures and improvements in drug therapy are also included in the important new developments. The physician now has at his command an array of therapeutic agents which singly or in combination assist the ailing heart to carry on. When congestive failure has occurred, such as in the cases described above, it is usually necessary to employ a digitalis preparation and

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one or more diuretic agents. Recently developed oral organomercurial diuretics appear to be an important addition to the physician's therapeutic armamentarium since, among other things, they reduce the necessity for frequent parenteral diuretic therapy.

Summary

DURING the past decade there has been increasing recognition and acceptance of the fact that many cardiacs can be employed without adverse effect on the course of their heart disease.

Relatively little attention has been paid to the possibilities of employment for patients with congestive heart failure.

Various combinations of digitalis with oral and parenteral organomercurial diuretics are useful in keeping cardiacs with congestive failure in gainful employment.

The occupational potentialities of cardiacs with congestive failure merit further investigation.

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Till the Doctor Comes

A HANDY HEALTH GUIDE FOR EXECUTIVES

ONCE UPON A TIME, people used to think that top-ranking business men paid for their success by exposure to a whole host of insidious "executive ailments." Today, however, some medical spoilsports allege that a president, given reasonable care, can last as long as a plumber or a piano-tuner. This, if true, does tend to rub some of the gilt off the managerial halo. Nevertheless, martyrdom is still within the reach of any executive who is really determined to live dangerously. All that's needed is a bit of know-how. For instance: *Stay away from doctors.* Regular medical examinations are for sissies, not human dynamos. Only a snivelling hypochondriac would enter a doctor's office under his own power. *Keep a taut schedule.* Your time is the company's time, so don't waste one precious minute. Why coddle yourself with an occasional breathing spell? You're not being paid to breathe! *Combine business with pleasure* — particularly at social gatherings. It's true that the deal you arrive at in an hour of chatter over the Martinis could be consummated in 10 minutes of direct negotiation — but it wouldn't give you the same glow. *Never drop your guard.* Keep up your dukes — and your adrenalin level — at all times. The boss asks you to lunch? He's planning to probe your inadequacies. A subordinate makes a suggestion? Watch him — he's gunning for your job! *Have everything clear through you.* Whether it's a million-dollar order or the bi-weekly sump-pump performance report, better give it a quick once-over to make sure it's been done right — i.e., the way *you* would have done it. *Use your nights constructively.* Why waste time sleeping when everyone knows the small hours are most favorable for flashes of creative insight? If your eyes persist in closing, mull over J.B.'s hint last week about possible cuts in your department. *Smile if it kills you.* What if the plant does break down while you're trying to make a contract deadline? What if the boss does turn down your carefully considered sales plan without a hearing? What if a subordinate's blunder does wreck that delicate, vital deal you'd been negotiating for months? Maintain a calm, imperturbable exterior at all costs. What's happening to your insides is nobody's business but the surgeon's. *Save your energies for the job.* You're being paid to use your brain, not your muscles, so don't walk; travel by cab or company limousine whenever possible. Avoid all exercise like the plague, except when you must run to catch a train. *Put your vacation to use.* It gives you a perfect opportunity to inspect all the plants in the Rocky Mountain Division. After you've reviewed the mid-season production plans, had a look at the new equipment and addressed a foreman's meeting, you can probably manage to fit in a round of golf with the plant manager. *Eat, drink, and be dynamic.* You can doubtless close the deal over dinner (was it really lunch-time when you came in?). Anyway, the bigger the meal, the bigger the order. The company will be glad to pick up the check — and you've got plenty of insurance. *Keep climbing.* To reach the top, you should resolutely disregard any fatigue or injuries along the way. If you're controller, aim for treasurer. If treasurer, president. If president, why not buy out the competition? An impressive obituary is worth all the effort.

—LYDIA STRONG, in *The Management Review*, November, 1956.

Guide for Conservation of Hearing

Prepared by
Subcommittee on Noise in Industry of the Committee on Conservation of Hearing
American Academy of Ophthalmology and Otolaryngology
ARAM GLORIG, M.D., Director, Subcommittee Research Center

ALTHOUGH there is still much to be learned about the relations of hearing loss to noise-exposure, we have accumulated enough information through experience and research to enable us to organize and conduct hearing conservation programs. This basic information is, in brief:

1. Many noise-exposures can produce a permanent hearing loss that may affect communication by speech.

2. Noise-induced hearing loss may be transient, permanent, or a combination of transient and permanent.

3. Permanent noise-induced hearing loss is due to destruction of certain inner ear structures which cannot be replaced.

4. The amount of hearing loss produced by a given noise-exposure varies from person to person.

5. Noise-induced hearing loss first affects man's hearing of sounds higher in frequency than those necessary for communication by speech. Therefore, most early noise-induced hearing losses pass unnoticed unless they are detected by suitable hearing tests.

6. Four major factors characterize noise-exposure: (a) over-all noise level; (b) composition of the noise; (c) duration and distribution of exposure during a typical workday; (d) total time of exposure during a work-life.

7. Man's hearing ability and noise-exposure can be measured reliably by competent, properly qualified personnel. (The measurement and evaluation of impact noises, which are produced by drop hammers, riveting guns, etc., present special problems.)

8. To be effective a hearing conservation program should include: (a) a noise-exposure analysis; (b) provision for control of noise-exposure; (c) measurements of hearing.

The Subcommittee on Noise in Industry of the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology, is composed of the following members:

HOWARD P. HOUSE, M.D., Chairman, University of Southern California, Los Angeles.

HALLOWELL DAVIS, M.D., Central Institute for the Deaf, St. Louis, Missouri.

KENNETH M. DAY, M.D., University of Pittsburgh, Pittsburgh.

MEYER S. FOX, M.D., Marquette University, Milwaukee, Wisconsin.

GORDON D. HOOPLE, M.D., Syracuse University, Syracuse, New York.

DEAN M. LIERLE, M.D., University of Iowa, Iowa City.

C. STEWART NASH, M.D., University of Rochester, Rochester, New York.

PROFESSOR WALTER A. ROSENBLITH, Massachusetts Institute of Technology, Cambridge, Massachusetts, (Consultant).

The Need for a Hearing Conservation Program

THE initiation of a hearing conservation program should be considered whenever persons have: (1) difficulty communicating by speech while they are in the noise, or (2) head noises or ringing in their ears after working in the noise for several hours, or (3) a loss of hearing that has the effect of muffling speech and certain other sounds after several hours of exposure to the noise. (This hearing loss is transient and usually disappears in a few hours.)

Absence of pain should not be construed to mean absence of hearing loss. Pain is produced in the ear when noise levels are of the order of 130 db; noise-induced hearing loss, however, may be produced at considerably lower noise levels. Pain and annoyance are not reliable indicators of a potential noise-induced hearing loss. The decision to initiate a hearing conservation program should not be influenced by the presence or absence of these symptoms.

Ultimately, the analysis of noise-exposure is the only completely satisfactory way of establishing the need for hearing conservation.

Outline of a Hearing Conservation Program

ANALYSIS OF NOISE-EXPOSURE. Noise-exposures are analyzed in terms of: (a) over-all level; (b) composition of the noise; (c) duration and distribution of exposure during a typical workday; and (d) total exposure time during a work-life.

Measurement of each of these four factors of noise-exposure is important for hearing conser-

vation. Even though two different noises have the same over-all level, their compositions may differ considerably (to such an extent, in fact, that one may produce a permanent hearing loss while the other may not). Also, the auditory effects of continuous noise-exposure are different from the effects of intermittent exposure to the same noise.

CONTROL OF NOISE-EXPOSURE. Noise-exposure may be reduced by personal protection or by environmental control such as: (1) reducing the amount of noise produced by the source; (2) reducing the amount of noise transmitted through air or building structures; (3) revising operational procedures. The most satisfactory method of environmental control of noise-exposure is to control the noise at the source. Unfortunately, this is not always possible. When the amount of noise produced by the source can not be sufficiently reduced a combination of control methods may be required to conserve hearing.

MEASUREMENT OF HEARING. A hearing conservation program should include: (a) preplacement hearing tests; and (b) routine periodic follow-up tests.

These tests of hearing are the most important part of a hearing conservation program. They provide a record of the initial status of an employee's hearing and make it possible to follow any subsequent changes in hearing ability. Preplacement and follow-up tests help to identify persons who may be highly susceptible to noise-induced hearing loss. Test results will show whether the conservation program is effective or not.

Even when noise-exposures are not severe enough to warrant a hearing conservation program, it is desirable to test hearing systematically as part of routine physical examinations.

Responsibility for Conservation of Hearing

MEDICAL RESPONSIBILITY. The conservation of any human function is primarily a medical responsibility. Hearing conservation is no exception. Prevention, diagnosis, and treatment of hearing loss; validation and approval of audiometric records; and the final assessment of measurements of hearing are medical responsibilities. Any hearing conservation program without medical supervision must be considered inadequate.

Direct medical supervision of a hearing conservation program is highly desirable. Here a physician is responsible for the organization and administration of the testing program as well as for checking and evaluating audiometric records. The physician himself does not perform all the operations necessary to the conduct of the program; he delegates responsibility for many of the technical activities to members of his staff, setting up standards or limits within which they can operate semiautonomously. Whenever medical records show that control of noise-exposures may be inadequate, the physician in charge so reports.

The responsibility for making necessary noise measurements and for effecting further environmental noise-exposure controls then devolves on the industrial hygienist, members of the engineering or safety departments, or other persons assigned to the task. Although the actual operations of measurement and protection are performed by both medical and nonmedical personnel, the physician ultimately is responsible for the health of the employee.

Medical supervision must be available if a hearing conservation program is to serve its dual purpose of preventing hearing loss and providing valid records for compensation claims. Many companies do not have a full-time Medical Department and cannot provide direct medical supervision for a conservation program. These companies can, however, satisfy the general requirement of medical supervision by employing medical consultants.

GENERAL COOPERATION. The success of hearing conservation depends on the complete cooperation of employer and employee alike. All groups stand to benefit equally from a hearing conservation program, and all groups should give the program their active support. Supervisory personnel should initiate noise measurements, make the environmental changes that are necessary for noise-exposure control, furnish any required ear protection and make it readily available to all employees, acquaint all employees with the benefits to be derived from hearing conservation, and, by example, promote attitudes that will benefit the program.

Each employee should make proper use of the personal protection that is provided, obey environmental regulations, and participate willingly in the hearing testing program.

Assessment of Noise-Exposure

GENERAL. Most industrial noises can be classified as either impact-type noise or steady noise. Impact noise (generated by drop hammers, punch presses, paper shredders, etc.) are composed mainly of sharp bursts of sound. Each burst begins to die away before the succeeding one is generated, producing the over-all effect of a rapid rise to a maximum of intensity followed by a somewhat slower decay. Because of these characteristic rapid fluctuations, one must use special equipment and special techniques to measure the levels of impact noise. "Steady" noises, on the other hand, (generated by compressed air, diesel engines, lathes, etc.) are more easily analyzed. Intensity fluctuations in steady noises take place at irregular intervals and involve only

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a narrow range of frequencies at any one time. Over-all levels tend to stay the same.

The acoustic energy in noise is seldom distributed uniformly among the component frequencies. In some noises (piston engines, pit furnaces) the energy lies mostly in the lower frequencies, in others (pneumatic peen hammers, high-speed cut-off saws) it is predominantly in middle and high frequency ranges. The frequency distribution of energy in a noise, the noise spectrum, can be found by measuring noise levels in each of several "bands" of frequencies. These bands are selected from the over-all noise by means of filters. Band widths commonly used in noise analysis range from octave band to half-octave, third-octave and even narrower.

METHODS OF MEASUREMENT (steady noise). Both the over-all level and octave band levels must be measured whenever noise-exposure evaluations of steady noise are made.

(a) *Noise Levels and Composition of the Noise.* Over-all sound levels of steady noises may be measured with a sound level meter (often designated SLM). The "C" or flat response scale of a sound level meter measures average over-all sound pressure level in decibels re 0.0002 dynes per square centimeter. The meter indicator responds to irregular fluctuations present in steady noise and usually does not remain fixed in one position while a measurement is being made. Because of these fluctuations the average of several readings taken at a measuring point is recorded as the over-all sound pressure level of the noise at that location.

An octave band analyzer (often designated OBA) consists of a series of electronic filters that select for measurement each of several octave bands in the noise. Most standard analyzers are designed to filter eight octave bands: 37.5-75, 75-150, 150-300, 300-600, 600-1200, 1200-2400, 2400-4800, and 4800-9600 cps. Some analyzers are designed to measure sound pressure level in one-third octave bands or in narrow bands of constant width, for example, five cycles or 20 cycles. Such measurements are entirely acceptable, but are not necessary for hearing conservation purposes. The sound level meter and octave band analyzer do not measure impact noise levels accurately. If a noise-exposure includes impact noises, qualified acoustical engineers should make the noise measurements with special equipment.

Noise level measurements should always be made at the approximate position of the employee's most exposed ear. To take account of the noise level variations produced by changes in operational schedules or procedures, repeated measurements should be made during a single day as well as on different days of the week.

The measurement of noise-exposure requires a high degree of skill. It should be undertaken only by personnel with training and experience in making physical measurements with electronic equipment.

(b) *Duration and Distribution of Exposure During Workday and Work-life.* Noise-exposure cannot be assessed by noise measurements alone. The effects of continuous exposure to a given noise level differ from the effects of an exposure interrupted by periods of reduced noise level. Therefore we must know how the exposure to noise is distributed in time throughout a representative or typical workday. Also, before the assessment of noise-exposure is complete we must determine the expected total exposure time during a work-life.

HEARING CONSERVATION AND NOISE-EXPOSURE. Two things must be considered before we can set a limit beyond which noise-exposures are judged to be severe enough to warrant an organized program of hearing conservation. First, can a realistic hearing conservation program provide complete protection for all ears; and, second, what do we know about the effectiveness of the different components of noise-exposure in producing hearing loss?

(a) *Limitations of a Practical Hearing Conservation Program.* The aim of hearing conservation is to prevent loss of hearing for all persons exposed to noise, but unfortunately complete protection cannot always be realized. Sometimes practical programs can achieve only a limited goal. For example:

1. Prevention of hearing loss at all audible frequencies may not prove possible. Particular efforts should then be made to protect hearing at the frequencies most important to communication by speech (500, 1000, and 2000 cps).
2. Prevention of hearing loss in every person who is exposed to noise may not be possible. Some few ears are highly susceptible to noise-induced hearing loss. As yet, there is no predictive test that will enable us to identify persons with highly susceptible ears. No practical general rule of protection is equally effective for all persons exposed to noise; the protective measures that prevent loss of hearing in normally-susceptible ears are not effective for highly susceptible ears.

(b) *Noise-Exposure and Hearing Loss.* Noise-induced hearing loss depends upon noise levels and exposure time. Any attempt to assess the need for hearing conservation must take account of both.

The effects of continuous exposure to steady noise may depend on the way the sound energy is distributed in the noise. Early noise-induced hearing losses are usually confined to the frequencies around 4000 cycles per second. As the exposure lengthens the losses spread to lower frequencies, whose audibility is more directly involved in the understanding of speech. Data on noise-induced

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hearing loss, both temporary and permanent, indicate that the losses occur at frequencies above those that characterize the exposure sounds. Since the most important frequencies to be protected are in the range 500 to 2000 cps, inclusive, it follows that the 300-600 and 600-1200 cps bands deserve our major attention if we are trying to protect man's hearing for speech.

At the present time our knowledge of the relations of noise-exposure to hearing loss is much too limited for us to propose "safe" amounts of noise-exposure. We can, however, point to certain noise levels that indicate when it is advisable to initiate hearing conservation programs. These levels will not be general because a different level is needed for different types of noise and different schedules of exposure. The hearing conservation level that we now specify tentatively applies only to years of exposure to broad-band steady noises with relatively flat spectra. It does not apply to short exposures, and, above all, it does not apply to impact noises or narrow band noises. This tentative hearing conservation level is stated as follows:

If the sound energy of the noise is distributed more or less evenly throughout the eight octave bands, and if a person is to be exposed to this noise regularly for many hours a day, five days a week, for many years, then, if the noise level in either the 300-600 cycle band or the 600-1200 cycle band is 85 db, the initiation of noise-exposure control and tests of hearing is advisable.

The more the octave band levels exceed 85 db the more urgent is the need for hearing conservation.

The 85 db is not an over-all sound pressure level; it refers to two particular octave bands. The over-all level of noise is always higher than the level in any one octave band; in typical industrial steady noises it may be as much as 20 db higher.

Over-all and octave band levels measured in three typical industrial noises are reported in Table I. For all three of these noises the over-all level exceeds the level in the 300-600 or the 600-1200 octave bands by at least 10 db and for one noise by 16 db.

TABLE I.
OCTAVE BAND ANALYSIS OF THREE TYPICAL INDUSTRIAL NOISES

Over-all Level	Sound Pressure Level in db re 0.0002 dynes/cm² — Octave bands (cycles per second)							
	37.5 to 75	75 to 150	150 to 300	300* to 600	600* to 1200	1200 to 2400	2400 to 4800	4800 to 9600
103	84	85	87	93	93	95	97	87
101	91	97	98	85	85	81	80	82
95	84	84	85	84	84	86	88	84

*Octave bands specified in the tentative hearing conservation level.

Control of Noise-Exposure

ENVIRONMENTAL CONTROL. The environmental control of noise-exposure requires highly technical skills and should be undertaken only with the help of acoustical consultants. Noise-exposure may be controlled by one or more of the following methods:

(a) *Reduction in Amount of Noise Produced by the Source.* This method is the most satisfactory for hearing conservation purposes, but it is not always practical or possible. A reduction in the amount of noise produced by a machine or a machining process may be accomplished by: (1) careful acoustical design of new machines; (2) modification of design of machines now in use; (3) proper upkeep and repair of equipment; (4) muffling exhausts; and (5) changes in methods of processing.

(b) *Reduction in Amount of Noise Transmitted Through Air or Building Structures.* Control of noise transmission may lower the over-all noise level in a general work area, but it has little if any effect on the noise source or on noise levels in the immediate vicinity of the source. A reduction in the amount of noise transmitted to the work area can be accomplished by: (1) increasing the distance between the work area and the source of noise; (2) constructing barriers between the work area and the source of noise; (3) sound-treating work areas to reduce reverberation; and (4) placing equipment on vibration mounts.

(c) *Revision of Operational Procedure.* When necessary and possible, these procedural changes may be used to reduce the noise-exposures: (1) changing job schedules; (2) rotating personnel; (3) enclosing remote control stations; and (4) constructing observation booths.

USE OF PERSONAL PROTECTION. Ear protectors in effect reduce noise levels at the inner ear. Ear protection is particularly important when noise-exposures cannot be controlled adequately by environmental changes.

(a) *Types of Ear Protector.* Ear protectors may be: (1) ear plugs; or (2) ear muffs.

Ear plugs are designed to occlude the ear canal. They may be made of rubber, neoprene, plastic, or cotton impregnated with wax. Contrary to popular opinion, dry cotton affords no protection. Material and shape have little to do with the effectiveness of commercially available plugs except as they affect acceptance by users.

Ear muffs are designed to cover the external ear. At frequencies above 1000 cps muffs provide about the same protection as plugs. At frequencies below 1000 cps only certain recently designed muffs provide as much protection as plugs. (See Table II for some typical attenuation figures.)

Whether to wear plugs or muffs or both depends in part on the work situation. Will the employee's head be confined to a work space so small

TABLE II.
AVERAGE ATTENUATION OF EAR PROTECTORS
(IN DECIBELS OF THRESHOLD SHIFT)
MEASURED IN THE FIELD AND IN THE LABORATORY

Ear Protector Tested	Frequency in Cycles Per Second								
	250	500	750	1000	1500	2000	3000	4000	6000
Seven types of ear plug-lab. n=8	12.6	13.0		19.0		25.7	29.3	27.2	29.7
Two types of ear plug-field* n=25		10	10		16		24		23
One type of ear plug-lab. n=3	28	29		26		34	45	45	45
One type of ear muff-lab. n=3	20	32		43		44	42	38	34
Combination plug and muff-lab. n=3	38	45		41		45	49	47	34

*The low values of attenuation found in the field can be explained in part by the fact that several of the subjects wore plugs that were too small to provide a good seal.

there is no room for muffs? Must he wear a hard hat in addition to ear protection? And so on. There are advantages and disadvantages to the use of either plugs or muffs, and before a choice is made between the two, all the circumstances of a particular job should be considered.

(b) *Fitting and Indoctrination.* An employee's ears should be examined and his hearing tested at the time he is fitted with ear protectors. Plugs should be fitted individually for each ear; if the ear canals are not the same size or shape they may require plugs of different size. To promote the acceptance of ear plugs an employee should be allowed to choose from three or four different makes at the time he is fitted.

As with other kinds of personal protection (hard hats, safety glasses, safety shoes, or respirators) it may be difficult to convince employees that they should wear ear protectors. Successful personal protection programs are based on thorough indoctrination of personnel. An employee must be impressed with the importance of ear protection and the benefits to be gained from its consistent use. He should be told.

1. Good protection depends on a good seal between the surface of the skin and the surface of the ear protector. A very small leak can destroy the effectiveness of the protection. Protectors have a tendency to work loose as a result of talking, chewing, etc., and they must be reseated from time to time during the work day.
2. A good seal cannot be obtained without some initial discomfort.
3. There will be no untoward reactions as a result of the use of ear protectors if they are kept reasonably clean. (Skin irritations, injured ear drums, or other harmful reactions are exceedingly rare. A properly designed, well-fitted and clean ear protector will cause no more difficulty than a pair of safety goggles.)
4. The use of ear protection will not make it more difficult to understand speech or to hear warning signals.

Most of the available ear protectors, when correctly fitted, provide about the same amount of protection. The best ear protector, therefore, is the one that is worn properly. Properly fitted protectors can be worn continuously by most persons and will provide adequate protection against most industrial noise-exposures.

Ear plugs do not provide the same amount of attenuation in the field as in the laboratory, probably because of incorrect fitting and failure to maintain a good seal even with properly fitted plugs. Limited research data indicate that in the field ear plugs provide on the average about 5 db less attenuation than in laboratory tests.

Measurement of Hearing

METHODS OF TESTING. The measurement of hearing ability is the most important part of a hearing conservation program. Both preplacement and periodic follow-up tests of hearing should be part of the program routine. Preplacement tests are made primarily to establish an auditory baseline and, together with follow-up tests, to provide a record of subsequent changes in hearing (due to accident, disease, age, noise-exposure, etc.).

(a) *Preplacement Threshold Tests of Hearing Ability.* Air conduction threshold tests are recommended for preplacement use. The thresholds measured by these tests are sound pressure levels at which certain standard preselected frequencies can just be heard. The term "air conduction" describes the path by which the test sounds reach the ear. In industrial air conduction tests, the test sounds are generated by earphones and conducted through the air in the ear canal to the drumhead. Recommended test frequencies are 500, 1000, 2000, 3000, 4000, and 6000 cycles per second. The record of measured thresholds is called a threshold audiogram.

Preplacement threshold audiograms should be made for all employees, not only for those who are to work in noisy areas. Such a record may show, for example, the presence of early hearing loss of a type that is responsive to suitable therapy. Detection and treatment of these non-noise-induced hearing losses will help to prevent their

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subsequent progress and the resulting loss of trained personnel.

If a preplacement audiogram shows an average hearing loss of more than 15 db at 500, 1000, and 2000 cycles per second, the employee should be referred to a physician for otological examination and placement evaluation before assignment to a job. Such referral is also advised for employees whose audiograms show any unusual irregularity, particularly an abrupt loss beginning at 2000 cycles per second.

Whenever preplacement tests are given, the tester should ascertain that a period of at least 16 hours has elapsed since the subjects' last noise-exposure.

(b) *Follow-up Tests of Hearing Ability* (Threshold Tests or Screening Tests). Periodic follow-up hearing tests must be given to persons stationed in areas where noise-exposures exceed the suggested hearing conservation level. Most early noise-induced changes in hearing ability occur in the region around 4000 cps. These early losses do not affect communication by speech and usually go unnoticed unless they are detected by follow-up tests. Some few persons are highly susceptible to noise-induced hearing loss and, until there is a valid predictive test to help identify highly susceptible ears, the periodic follow-up test is the only way to find them.

Follow-up tests may be either threshold tests or screening tests. Screening tests do not establish the auditory threshold, since they show only that a man's hearing is, at any frequency: (1) at least as good as, or (2) worse than some chosen screening level (10 db, 20 db, 35 db, 50 db, etc.). In our opinion, this information is inadequate to establish the initial status of an employee's hearing, and the screening test is not suitable for preplacement testing. For periodic follow-up tests, however, the requirements are less stringent. Here only changes in hearing need be detected, and these, only within certain limits. For follow-up tests properly designed screening tests are satisfactory.

Threshold Tests as Follow-Up Tests: The first screening follow-up test should be given approximately 90 days after placement unless an earlier test is indicated by long continuous exposure to noise levels greater than 100 db or by complaints of severe tinnitus, excessive temporary hearing loss, or excessively prolonged recovery from temporary threshold shifts. All follow-up tests should be made after as long a period of absence from noise as is practical (but at least 16 hours) to allow for as much recovery as possible from temporary threshold shifts produced during the previous work day. The preplacement threshold audiogram and the follow-up threshold audiogram are compared. If changes noted on the first follow-up audiogram are less than 15 db, it should be sufficient to make subsequent tests at approximately yearly intervals unless otherwise indicated.

If an employee's follow-up test shows a shift of 15 db or more in the direction of increased hearing loss at one or more of the six recommended audiometric frequencies, appropriate steps should be taken to conserve his hearing.

Screening Tests as Follow-Up Tests: The first screening follow-up test should be given approximately 90 days after assignment unless otherwise indicated. It should be given prior to any daily noise-exposure and after at least 16 hours absence from noise. The results of the screening test are compared with the thresholds measured in the preplacement test. If all changes noted on the screening follow-up test are less than 15 db, it should be sufficient to make subsequent follow-up tests at yearly intervals unless otherwise indicated. If the change at any frequency indicates a possible loss of 15 db or more, a threshold audiogram should be made to determine the actual magnitude of the loss at each of the recommended test frequencies. When at any test frequency this follow-up threshold audiogram shows a shift of 15 db or more in the direction of increased hearing loss, appropriate steps should be taken to conserve the employee's hearing.

Single-Frequency 4000 cps Screening Tests as Follow-up Tests: If the loss of hearing at 4000 cps is not more than 50 db, a single frequency 4000 cps screening test may be used as a follow-up test. Within the 50 db limitation the loss of hearing at 4000 cps will be as much as or more than the loss at any of the other recommended audiometric frequencies. This means that the measured value of the threshold at 4000 cps can be considered an upper limit for any threshold shift that may have occurred at the other frequencies. A gross check on changes of hearing can thus be made from measurements of the 4000 cps threshold.

When a single-frequency screening test is used it is advisable to screen at two or more levels 15 db apart so that threshold changes of the order of 15 db will be detected.

If the loss at 4000 cps is greater than 50 db, the single frequency test does not provide an adequate measure of change of hearing at other frequencies, and a threshold test should be used.

There are several reasons why a single frequency test of this type is desirable: (1) it can be completed in a few seconds, and large numbers of persons can be tested in a short time; (2) it may be given in any reasonably quiet room such as a quiet office; such background noises interfere very little with the hearing of 4000 cps at screening levels of 20 db and above; and (3) it may be given by personnel with a minimum of training.

(c) *Reassignment Tests.* If a large change in the auditory threshold is found by a follow-up test it may be desirable to reassign the employee to

conserve his hearing. Before reassignment a series of three recheck audiograms should be made. These audiograms should be made under similar conditions, but on different days. They should be made prior to any daily noise-exposure, and after at least 16 hours absence from noise-exposure. If the three agree within 10 db at four or more of the recommended audiometric frequencies, they are considered to be consistent. If so, the audiogram that gives the lowest average of the threshold values at 500, 1000, and 2000 cps may be used as a basis for reassignment. The employee should be referred to a physician for examination if the audiograms are not consistent.

STANDARD EQUIPMENT AND STANDARD PROCEDURES. (a) *Types of Audiometer.* Screening audiometers and diagnostic audiometers are suitable for giving pure tone air conduction threshold tests. Screening instruments (not to be confused with screening tests) as standardized by the American Medical Association and the American Standards Association are excellently suited to industrial needs for threshold audiometry. Diagnostic audiometers were primarily designed for diagnostic tests and may be needlessly expensive for industrial programs.

Individual or group automatic audiometers and group screening audiometers have special uses and will not be discussed here.

(b) *Calibration of Audiometers.* The accuracy of an audiometer should be checked regularly, at least once a month. This check, known as a "biological calibration," consists of making audiograms for three or more young persons who have no history of previous ear disease or hearing loss. The testing conditions and technique used in the biological calibration must conform to current standards. At each test frequency the average threshold of the young persons should be within 5 db of the audiometer zero: if not, the acoustical calibration of the audiometer is probably incorrect.

If the audiometer is not in correct acoustical calibration it should be returned to the manufacturer for service and adjustment. In any case an audiometer should be returned to the manufacturer for service once a year.

(c) *Audiometry Rooms or Booths.* Hearing test rooms should be located in as quiet a place as possible, preferably within practical access but away from outside walls, elevators, heating and plumbing noises, waiting rooms, and busy hallways. If the highest background noise levels do not exceed the values listed in Table III, test room noises will not affect test results.

Minimum inside dimensions of a test room are 4′ x 4′ x 7′6″. If the technician is stationed inside the test room it must be larger than this specified minimum size.

Test booths should be kept at a comfortable temperature. Air conditioning may be used if it does not raise the sound levels above the values shown in Table III. A fan should provide adequate ventilation and temperature control if temperatures in the area around the booth are moderate. The fan may be operated automatically by a switch that is on when the booth door is open and off when the door is closed. It may be necessary to devise other methods of ventilation to meet the specific requirements of local building codes.

TABLE III.
SUGGESTED ALLOWABLE BACKGROUND NOISE LEVELS FOR HEARING CONSERVATION AUDIOMETRY ROOMS
It is assumed that (1) no frequencies below 500 cps will be measured and (2) good-fitting binaural earphones will be worn.

Octave band cycles per second	300 to 600	600 to 1200	1200 to 2400	2400 to 4800	4800 to 9600
Level in db (C scale) re 0.0002 dynes/cm^2	40	40	48	57	67

No levels have been set for the octave bands, 37.5 to 75, 75 to 150 or 150-300 cps. The noise in these bands has little or no effect at the recommended audiometric test frequencies.

Acoustical treatment of audiometry rooms may prove to be a difficult task and should be undertaken only with the help of an acoustical consultant. Prefabricated audiometry booths usually are more satisfactory and may be cheaper than either reconstructed rooms or sound treated rooms.

(d) *Recording the Data.* A specially designed hearing conservation data card and instructions for its use may be obtained from the Research Center of the Subcommittee on Noise in Industry. The card is designed so that its contents can be transferred quickly to punched cards, thus facilitating the rapid analysis of large amounts of data. The card need not be filled in completely, but users are encouraged to check as many of the items as possible. A completed card contains the minimum amount of information needed to make a research study of the relations of hearing loss to noise-exposure. An experienced tester requires no more than six minutes to complete the hearing test and about three minutes to fill in the card.

(e) *Personnel Requirements and Training of Audiometric Technicians.* The audiometric tests recommended for use in hearing conservation programs can be conducted by trained audiometric technicians. Well motivated persons can be trained in a relatively short time to give good air conduction threshold tests. (Industrial audiometry does not require bone conduction measurements or masking procedures: these are diagnostic tools and should be used only for diagnostic purposes.)

Locations of possible facilities for the specialized training of industrial audiometric technicians may be obtained from the Research Center, Subcommittee on Noise in Industry, 111 North Bonnie Brae Street, Los Angeles 26, California.

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Although it is not essential to have a fully trained audiologist to make measurements of hearing, it is advisable to have a person with comparable training and background to organize and supervise the audiometric program when there are many employees to be tested.

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Lead Poisoning

IN THE Los Angeles branch of one of the largest industries in the world. a workman who, from previous experience, was cognizant of the symptoms of lead poisoning, believed he had it and so informed his foreman. The foreman laughed at him. The man was not referred to the Medical Department. He then chose an outside doctor who by proper tests proved the case to be one of lead poisoning. A day or two later a second worker made a similar claim. The foreman took the allegation to the plant superintendent, who also laughed, "why it is ridiculous — we don't have lead poisoning in this plant." Without going further into details, it was subsequently uncovered that some 20 men had varying degrees of lead intoxication and some 30 or 40 more who did not have it, claimed they had. A smart attorney put in multiple claims for permanent disability. By the time the company's hired attorneys, hygienist, Medical Director, and others from the home office had come to Los Angeles frequently over a period of a year to fight these false claims, and by the time final settlements were made, it cost the company nearly a million dollars. Human error? It surely was. In a large Los Angeles plant, following a case of plumbism, the nurse suggested the cause to a newly created superintendent. But he was "too busy making good in the front office" to pay heed until a succession of cases occurred. Then there was a recent situation in which a worker informed his immediate superior that the men had been issued the wrong type of respirator. The answer was an inference that the workers knew nothing about the proper selection of respirators. No — lead intoxication is not confined to the small plant, nor does it always result from the carelessness of a dumb workman. Likewise, to answer a previous question — who is the boss — I believe he should be one from top management. The efficiency of environmental control rests in the interest manifested by those at the top. Providing protective measures and posting directions are not sufficient.

—From "Facts and Fallacies of Plumbism and What to do About Them," by RUTHERFORD T. JOHNSTONE, M.D., in *Industrial Health Review*, Industrial Health Section, St. Louis Health Division, December, 1956.

Occupational Disease Report

State of California Department of Public Health

FOR THE seventh year, the California State Department of Public Health is presenting an occupational disease report based upon the *Doctor's First Report of Work Injury*. Section 6407 of the Labor Code, 1955, State of California, states that each physician who attends an injured employee, and each employer of the injured worker are required to file a report of the injury with the Department of Industrial Relations, when disability lasts beyond the day of injury or requires medical service other than ordinary first aid treatment. Any disease as well as any injury which occurs during the course of and arises out of employment is defined by law as an industrial injury.

Based upon the employers' reports, the Division of Labor Statistics and Research of the California State Department of Industrial Relations prepares statistical analyses of all disabling work injuries. The Bureau of Adult Health of the California State Department of Public Health, in accordance with an interagency agreement, reviews and analyzes those doctors' reports which concern occupational disease.

The analysis of the *Doctor's First Report of Work Injury is* subject to several limitations, one of which is incomplete reporting. Several disease categories, e.g., tuberculosis and tetanus, are known to be underreported, as ascertained by other methods.

A second limitation is incomplete coverage of the employed population. Reports are not received concerning workers who are not covered by the California Workmen's Compensation Act. In 1955 there was an average of 5,141,000 employed persons in California, of which about 80% were covered by the California Workmen's Compensation Act.[1] Groups not covered by the Act are self-employed and workers employed by farmers who elect not to be covered. Other groups are not covered because they are already under federal jurisdiction; federal employees, maritime workers, and most railroad workers in interstate commerce.

Another limitation of the *Doctor's First Report of Work Injury* is that it covers only the findings made at the first examination. This does not in all cases reflect the final diagnosis. Still another is that the amount of lost time given on the report is estimated by the physician at the first examination. This may result in some error concerning the actual duration of disability.

Despite such limitations, the reports serve as a guide in evaluating the size and kind of occupational health problems existing in California.

Industry Group

ALMOST every major group registered an increase in the number of reports received in 1955 as compared to 1954. Some of this increase may have been due to the increase in the number of employed persons covered by the California Workmen's Compensation Act, an increase of 6% over that of 1954.[2] The greatest proportion of cases were reported in the manufacturing industry, 40% of the total, followed by agriculture, 15%, and construction, 11%.

Since the proportions in Chart 1 do not take into account the number of persons at risk in

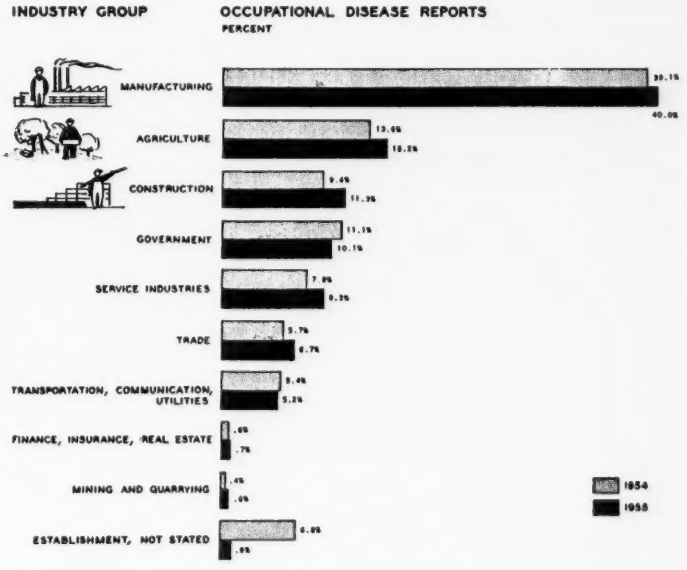

Chart 1.

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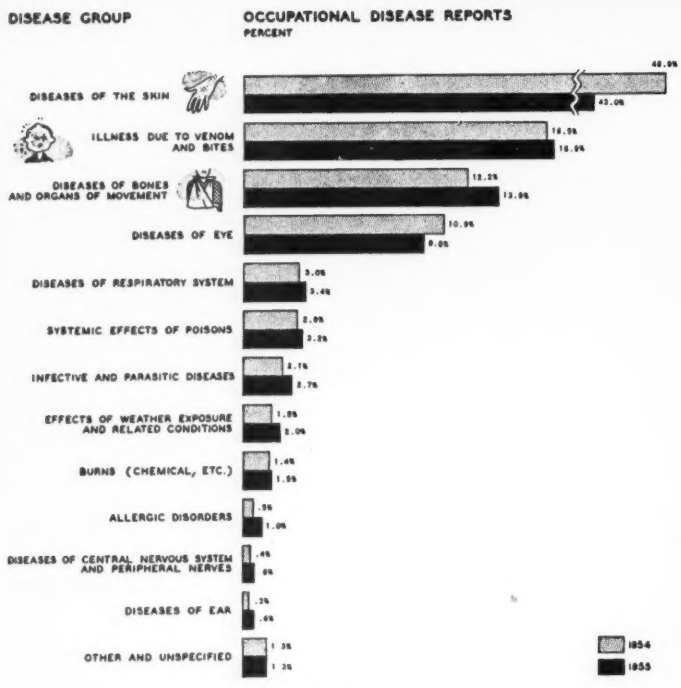

Chart 2.

each of the industrial categories, the following rates were computed to give some indication of this factor. The greatest risks were in agriculture, where 11.8 reports of occupational disease were received for every 1,000 workers, in construction with 10.4 reports and in manufacturing with 8.8 reports for every 1,000 workers.[3] These rates were based on all occupational disease reports regardless of lost time and should not be compared with industrial injury rates which are computed only for employers' report of lost time injury.

Forty-three percent of all reports were recorded as diseases of the skin, most of which were dermatitis attributed to chemicals and poison oak. The second largest category of reports, 17%, was that due to venom and bites, mostly bee stings and dog bites; and the third, 14%, diseases of bones and organs of movement, primarily bursitis and tenosynovitis.

Chart 2 shows the percent distribution of reports in several disease categories for 1954 and 1955. There was very little difference noted between the two years.

Of the 426 reports with a diagnosis of infectious diseases of the intestinal tract, 91% concerned persons working in agriculture. The diagnosis reported was almost without exception food poisoning. About 10 farm and farm labor organizations were implicated in these outbreaks, pointing to the need for further education in food preparation among these groups.

Of the 118 reports of diseases of bacterial, spirochetal, virus and rickettsial origin, 72% were of persons working in government, primarily state hospitals. The diagnosis given on most of these reports was infectious hepatitis, thus emphasizing the risk of infectious disease among employees in certain state institutions.

Reports of diseases of the skin represented the greatest numbers attributed to one category, 10,638. Seventy-two percent of the 3,508 poison oak dermatitis reports appeared to be evenly distributed among workers in agriculture (23%), construction (23%), and government (26%). The remainder of the reports of poison oak dermatitis were spread among the other industrial categories. Over half of the 4,620 reports of dermatitis attributed to drugs and other chemicals concerned workers in the manufacturing industries.

The large proportion of reports among government employees (32% of 171) attributed to cardiovascular and other diseases of the circulatory system may be a reflection of the law which rules this disease category occupational for the police and firemen.

Except in a few specific instances, the relationship of cardiovascular and circulatory system disease to occupation requires further study and clarification.

In 60% of the reports the physicians stated that no lost time occurred, in 27% some estimated lost time was indicated, and in 13% of the reports the query was left unanswered.

Nearly half of the 6,755 reports which recorded lost time indicated one to six days' duration and nearly 85% indicated lost time of 14 days or less. An exception to this relatively short duration of lost time was observed in diseases of bacterial, spirochetal, virus, and rickettsial origin in which 61% of the 101 reports recording some lost time, stated 15 or more days estimated lost time.

Also in the lost time category of 15 or more days were the bulk of reports in tuberculosis and cardiovascular and other diseases of the circulatory system categories.

It is of interest to note that for certain of the more classical occupational diseases, such as anthrax and beryllium poisoning, no reports were received. In the same way, it is of interest to note that there have been no reports of illnesses attributed to ionizing radiation, a disease hazard of increasing concern.

Agency of Disease

OVER HALF of the 24,736 reports for 1955 fell into such categories as bites and stings (17%), repeated motion, pressure and shock (15%), poison oak (14%), and welding flash (9%). These proportions are on the whole similar to those of 1954. Shown in Chart 3 is a proportionate comparison for 1954 and 1955 of agencies of disease in several broad groups.

Measures for the prevention of welding flash conjunctivitis are well known, yet in 1955 over 2,300 such reports were received. On the other hand, less is known about the prevention of poison oak dermatitis, but its very numbers makes it a field well worth investigating. Tenosynovitis, which accounts for most of the reports attributed to repeated motion, pressure and shock, is still another category worthy of the attention of both industrial physicians and industrial hygiene engineers.

It is of interest to note the frequency with which occupational disease has been attributed to certain of the more familiar agents which have been recognized as problems for many years, such as carbon tetrachloride 78 reports, lead 59, mercury 14, carbon monoxide 48. In all of these the principles of control are well known.

Considering for a moment the reports of occupational disease attributed to carbon tetrachloride, it may be seen that there were 55 reports received in 1954 and 78 in 1955. Thirty-nine of the 1955 reports concerned employees of manufacturing industries, many of whom were machinists, mechanics, technicians, custodians and the like who used carbon tetrachloride to clean metal parts, machinery or other equipment. In several instances, the carbon tetrachloride was applied as a spray.

Carbon tetrachloride fire extinguishers were given as the source of exposure in over one-fourth of the 78 reports. In most instances, the resulting conditions were described as varying degrees of respiratory tract inflammation. In about half of the reports concerning fire extinguishers, phosgene gas was given as the offending agent. Phosgene as well as chlorine under certain special conditions can be formed by the thermal decomposition of carbon tetrachloride in the presence of an open flame or other hot surface. Moisture, and the presence of a metal which can act as a catalyst, are reported to favor this reaction. In about one-fourth of the reports, the occupational disease attributed to carbon tetrachloride was dermatitis. In another fourth, already mentioned, the reported disease was in the respiratory inflammation category. The remaining half of the reports were in the systemic poisoning category. Of these, 11 included information on the report which indicated the poisoning was of a serious nature. In three of these instances of apparent severe poisoning, the type of exposure was described as having taken place over a period of time. In seven of the severe poisonings, the exposure was of a massive nature, occurring shortly before the onset of illness. On the eleventh report, information concerning the nature of the exposure was not given. Three of the workers who were severely poisoned had cleaned out refrigerators with carbon tetrachloride.

There was one fatality reported as due to carbon tetrachloride in 1955, which brings to 14 the total number of occupational deaths in California reported in 1951-1955 attributed to carbon tetrachloride.

Age and Sex

MEDIAN[4] ages were computed for both male and female workers for whom occupational disease reports were received. For the men median age was 34.6, for women 37.2, and for both sexes 35.1.

The age distribution of men and women for whom occupational disease reports were received appears in Table I. The proportion of

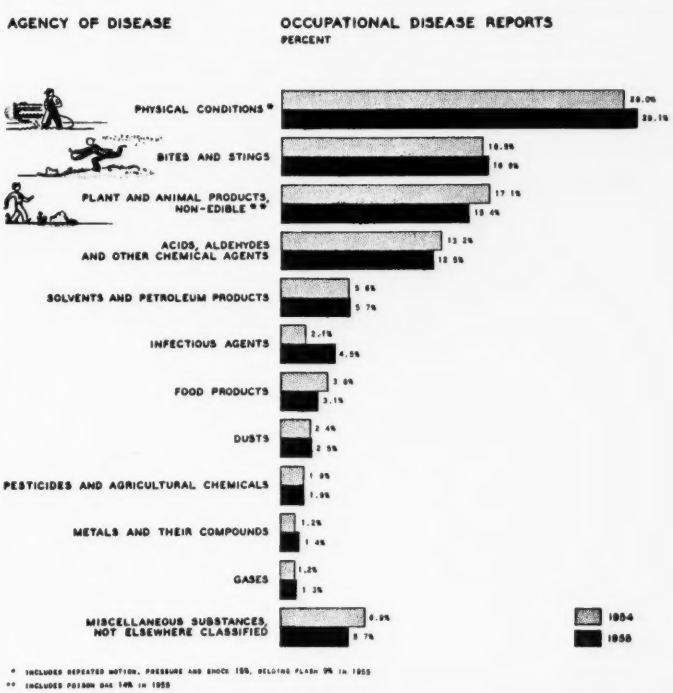

Chart 3.

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TABLE I.
OCCUPATIONAL DISEASE REPORTS

Age	Percent	
	Men	Women
Total	100.0	100.0
Under 14	0.3	0.2
14 - 15	0.3	0.3
16 - 17	1.3	1.0
18 - 19	3.4	4.0
20 - 24	12.3	10.1
25 - 29	14.5	11.2
30 - 34	15.0	13.2
35 - 39	12.0	15.7
40 - 44	10.3	13.1
45 - 49	8.0	10.4
50 - 54	6.3	7.3
55 - 59	4.1	4.4
60 - 64	2.6	2.3
65 - 69	1.0	0.6
70 - 74	0.3	0.1
75 and over	0.1	—
Age not stated	8.2	6.0

reports received for workers of different ages differed for the two sexes.

A higher proportion of reports from men were observed at younger ages as compared with women.

A larger proportion of reports for women were found in the older age group, 35-59.

There are also differences in the sexes in regard to the disease categories which were reported.

Ninety-seven percent of the 426 reports of diseases of the intestinal tract category concerned men. Men were also largely involved in reports of such diseases as conjunctivitis attributed to welding flash burn (99%), dermatitis attributed to poison oak (97%), systemic effects of gases and vapors (96%), systemic effect of pesticides and other agricultural chemicals (96%), and cardiovascular and other diseases of the circulatory system (93%). With the exception of the last category, men are largely employed in the industries where the hazards leading to these illnesses exist.

Nearly one-third of all the workers covered by the California Workmen's Compensation Act in 1955 were women.[5] Yet only 18% of the total occupational disease reports received in 1955 concerned women.

Women were named in 70% of all reports of diseases of bacterial, spirochetal, virus, and rickettsial origin. This reflects the frequency with which infectious hepatitis was reported from state institutions where women serve as attendants, nurses, technicians, etc. Nearly 65% of all the women in this disease category were in the age group under 35. Women were also named in 35% of reports of diseases of the ear; 51 of these 55 reports fell into the age group 19-35. Of interest is that these 51 reports concerned mainly airline employees. In both these categories women appeared to be younger than their median age.

TABLE II.
OCCUPATIONAL DISEASE REPORTS BY ESTIMATED LOST TIME AND SEX
(Percent)

Estimated Lost Time	Sex		
	Total	Men	Women
Total, Estimated Lost Time	100.0	100.0	100.0
No Lost Time	59.9	61.0	54.3
Lost Time	27.3	26.5	31.2
Not Stated	12.8	12.5	14.5

They were named in 45% of the reports of systemic effects attributed to industrial solvents. This high percentage is the result of an accident at one plant in which 62 women were made ill when they inhaled unsafe amounts of trichlorethylene.

Women appear to be disproportionately represented in the occupational disease reports; i.e., only 18% of the reports concern them, yet nearly one-third of the workers covered by the California Workmen's Compensation Act in 1955 were women.

Of the group for whom occupational disease reports were received, a greater percentage of women appeared to lose some time as compared with men. (See Table II.)

In the majority of the reports, however, the physician stated that no lost time had occurred for both sexes.

The proportion of women who were said to have lost seven or more days was greater than that of men for each age group for which information was available. (See Table III.)

The proportion of illnesses of seven days or more appeared to increase with age when comparing men under 35 with men 35 and over.

TABLE III.
OCCUPATIONAL DISEASE REPORTS BY ESTIMATED LOST TIME, SEX AND AGE
(Percent)

Estimated Lost Time	Men					Women				
	Under 19 years	19-34 years	35-64 years	65 years and over	Age not stated	Under 19 years	19-34 years	35-64 years	65 years and over	Age not stated
Total, Estimated Lost Time	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	*	100.0
No Lost Time	60.0	64.3	61.1	57.2	44.5	46.4	57.5	52.9	*	52.5
1 - 6 Days	15.3	15.9	12.4	8.4	19.8	12.4	10.2	7.6	*	8.7
7 Days and Over	12.1	9.7	13.4	20.0	9.7	22.2	20.1	23.6	*	18.2
Indefinite	0.3	0.2	0.5	1.4	0.2	1.3	0.2	0.6	*	—
Not Stated	12.3	10.0	12.5	13.0	25.8	17.6	11.9	15.3	*	20.5

* Percentages not calculated for less than 100 cases.

Fatalities

OCCUPATIONAL disease fatality reports are obtained from several sources. Data of deaths from silicotuberculosis come from the death records of the California Department of Public Health.

The sources of the remainder of the deaths included in the tabulation are the fatal cases reported to the Division of Labor Statistics and Research in the Department of Industrial Relations and decisions made by the Industrial Accident Commission. Deaths reported from the Industrial Accident Commission relate to the year in which a settlement was made and not necessarily to the year of death.

Fatalities reported from all sources in 1955 totaled 226. Of these, more than half (115) were deaths that occurred prior to 1955. Of special interest were the five poisonings, one each from benzene, carbon tetrachloride, chlorate defoliant, lead, and trichlorethylene.

References

1. State of California, Department of Industrial Relations, *Estimated Civilian Employment in California, 1940-1955*, March 1956. The number of employed persons includes self-employed as well as wage and salary workers.
2. Estimates are from the State of California, Department of Industrial Relations.
3. Employment by industry estimates are from the State of California, Department of Industrial Relations. The employment figures are only for those workers who come under the California Workmen's Compensation Act.
4. A median is the half-way point in a series of observations ranged in order from lowest to highest.
5. Estimate by State of California, Department of Industrial Relations.

Can Management Potential Be Predicted?

SCIENTIFIC systems for predicting management potential can be developed by pooling experiences of many companies, indicates preliminary research at the Management Development Laboratory, Industrial Relations Center, University of Minnesota. Although a company's growth is at stake when it selects its future executives, predictions of management potential are generally based on hunches or prejudices. Few companies make frequent enough predictions of management potential to build up experience needed to construct and test a system for predicting it. Usefulness of psychological tests and application blanks (or personal histories) as predictors is now being studied at the Management Development Laboratory. Almost 250 managers, ranging from first-line supervisor to company president, in six different Minnesota companies have taken battery of psychological tests and completed lengthy personal histories. A single-weighted score for the various psychological tests and a weighted score for the application blank were used to predict job success. If this scoring system had been available at time participating managers were hired: a critical score on the psychological tests could have eliminated over half of the "low-ranked" managers, while losing only one-fifth of the "high-ranked." One of the possible critical scores on the application blank would have eliminated almost two-thirds of the "low-ranked" and only 16% of the "high-ranked" managers at time of hiring. Composite profile of all of managers participating in study is presented below. Insofar as it differs from picture of the "typical" American male, it provides clues for prediction of management potential, says Management Development Laboratory. "Composite" manager participating in study: came from a relatively large family, lived at home until 21, and received schooling beyond high school; worked while attending school, became self-supporting in late teens, and has worked in only few companies during his career; married during middle 20's to a high school graduate who continued working a year; became father in late 20's; is above average in intelligence, understanding of others, is industrious, possesses confidence and initiative. "High-ranked" managers when compared with "low-ranked" managers show up as: having lived with parents longer and became self-supporting at later age; more educated, and as having participated in more organizations during school and young adult years; more intelligent, confident and dominant.

—From *Industrial Relations News*, March 16, 1957.

Industrial Health Council of Greater Atlanta

THE INDUSTRIAL Health Council of Greater Atlanta, Inc., is a nonprofit community organization which inaugurated a program of multiple screening December 28, 1955. It is dedicated to better health among employee groups through a series of health tests administered once a year. During its first year of operation 10,000 employees (both white-collar as well as manufacturing) in Atlanta received these tests. Its services are available to any company or group of employees. Primarily this is a mobile service.

The Council's medical policy operates under the direction of a committee representing the Fulton County Medical Society (Atlanta) and for "working" direction it retains, on a fee basis, a radiologist, a clinical pathologist, and an ophthalmologist. The Healthmobile is staffed by five medical technicians and the laboratory has two technicians and an aide. The program strictly is a preventive one. The effort is to detect early indications of specific listed diseases so that prompt medical attention may be procured by the employee where deemed desirable. The procedures manifestly serve the interest of the employee and likewise serve the company in that some valuable employees and executives may be assured of better physical working qualifications and at times prolongation of working and total life.

The essence of the Council's work is case finding through laboratory procedures. If these measures reveal significant or suspicious findings the effort then is to direct the employee to the physician of his own choice for whatever medical attention that physician may regard as in order. The Council itself, and its medical consultants and technical staff, do not engage in final diagnosis, nor any treatment of the Council's clientele, nor is any form of insurance sponsored.

The Council does not characterize its constellation of tests as a physical examination. Such is left to the physician. No less it is emphasized that the program is approved by the medical profession and is recognized as embracing important procedures in health conservation.

IN THE early days some opposition on the part of a minority of local physicians was encountered. However, once the program and its coverage and limitations were defined and demonstrated as embracing no degree of corporate or socialized medical activity, then official approval of organized medicine was secured. At all times it has been recognized that a program of this nature will be accorded heartier medical support if strictly it refrains from any aspect of diagnosis, medical evaluation or treatment that naturally fall in the domain of the physician, and if it is conducted under physician authority over medical policies and standards.

Although some employees who have been tested have sought to have these services extended to their families on a private payment basis, scrupulously these overtures have been rejected. By agreement with the Fulton County Society, all services are limited to the enrolled workers of the numerous companies visited.

IN MOST instances the companies pay the total cost for all tests which is at the rate of $5.00 per employee per year. In some instances companies halve the cost, and in other instances employees themselves pay for the tests. Most of the subscribing companies are small or medium in size. Large firms already have Medical Departments. Some of them provide annual preventive physical examinations for executives. Only a few extend this service to all their employees.

The fully equipped Healthmobile goes directly to participating companies where employee and executive groups are screened once a year for certain major chronic diseases.

In some instances a repeat test is performed. This is done to make sure about the original finding, and to strive to prevent advising anyone to seek medical attention needlessly on any of the tests which the Council performs. These second tests are done at no extra cost to the company or to the employee. The tests are not disruptive to operations. Every person re-

Fig. 1.
Council Healthmobile parked at administration building, Emory University, for annual chest x-ray on students, faculty and employed foodhandlers.

quires about 10 minutes to go through the Healthmobile. With steady scheduling, the Healthmobile handles up to 110 persons per day.

AS NOW conducted, the routine laboratory procedures are:

X-ray to check for indication of chest problems such as tuberculosis, silicosis, lung cancer and certain heart abnormalities.

Blood sugar test for diabetic tendencies.

Blood test for indication of syphilis.

Charted height and weight determination for obesity.

Hemoglobin test for indication of anemia.

Urinalysis for albumin content.

Blood pressure test.

Comprehensive check on vision, using modern equipment.

Within two weeks after the tests have been completed, a confidential report is sent each person who participated, at his home address. In keeping with medical policy, the Council does not report test findings to the company on any individual employee. The company does receive an over-all summary stating the number and type of significant disclosures indicated, and the Council is glad to work closely with company doctors and nurses.

When employees receive these tests year by year the companies served are likely to observe a decrease in their medical load, since the program eventuates in improved personal medical care on a private basis.

The majority of subscribing companies are in accord with the policy of no individual reports to employers, but some companies will not take the services on account of this feature. The Board of Directors has debated the desirability of asking the Medical Policy Committee to work out a different policy in this respect. It is granted that some individuals may be negligent in procuring the medical action advised as a result of this laboratory program. In one instance an employee was killed under circumstances that indicated some connection with severely defective vision that had been detected in the program and yet the examinee had not followed the recommendation and had not procured improved vision under the guidance of an ophthalmologist. If the company had known of the circumstances, promptly this employee could have been transferred from his dangerous construction job and assigned to less perilous work, and promptly sent to an ophthalmologist. This accident cost the man's life along with hospital and compensation payments approximating $15,000. It is conceded that some advantages would arise if the employer might be apprised of outstanding situations such as described.

Some indication of the worth of this program derives from the information that not more than

Fig. 2.
Only 10 minutes per examinee is required for the routine battery of tests, with heavy work being done afterwards at the Council's laboratory and by its consulting radiologist.

10% of the adult population periodically obtain physician examinations. Factually the figure may be as low as 3%. In the Atlanta Council's experience it develops that only about 10% of employees with significant laboratory findings knew of the existence of abnormalities, or were under medical care for them. For instance, of 515 findings of blood pressure of 180/100 or above, only 10.6% said they were under medical care for this problem. Of the remaining 89.4%, a total of 18% gave past histories, but said they were not seeing a doctor, while 71.4% apparently were not aware of a possible blood pressure problem in any respect, either present or past.

FROM an unselected specimen group of 9,353 persons falling within the first year of services, the data now indicated have accrued:

Persons with significant findings	5,566
Vision defects, number of persons	3,547
Heavily positive urine albumin	43
Positive syphilis serologies (VDRL confirmed by State Laboratory Kahn, with Health Department seeing that person visited physician; 15 out of 162 reported not infected.)	162
Positive blood sugar (confirmed by glucose test)	80
Immediate chest referrals, basis 70 mm film	45
Old chest conditions noted on basis of 70 mm film	123
Called back for large x-ray film (about 61% referred; remainder normal or of no significance)	547
Blood pressure, 180 systolic, 100 diastolic	515
Overweight	2,172
Low hemoglobin	352

XUM

Comment

IN THE period of slightly less than the one year life of this organization, the case finding program has embraced 10,000 white collar and industrial workers. The goal for the next year, which approximates the calendar year for 1957, is 20,000 employees, although this number will include the retesting of the majority of the 10,000 employees first tested in 1956. The hope is that on a gradual state-wide expansion basis a goal of 300,000 yearly employees may be achieved. However, in any one Healthmobile unit the total yearly capacity is about 22,000.

Minority medical opposition to this type program often centers in the belief that a sense of false security may be created. On this account at all times there is continuing emphasis that the procedure does not constitute an evaluation of the employee's health nor is it a physical examination, nor does it replace the services of a physician. Further, each employee is told in writing both before and after the tests of the wisdom of seeing a physician periodically for "important health factors that a group of tests cannot cover." A handicap in the successful prosecution of this program and of simliar ones is the failure of some employees found to be in need of medical services to obtain such services. The Council is limited in the measures that it may exercise in the persuasion toward the procurement of medical guidance, but has a vigorous system of mail and telephone follow-through which it feels is obtaining good results. In indicated instances of tuberculosis and syphilis, a report is made to state and county health departments, which, in Georgia, have an enviable record of successful epidemiological follow-up and control of these diseases. The prospect still follows that the percentage of persons activated to seek preventive health care is higher than would be the case if such individuals were left to their own devices.

When the employee already is under the care of a physician for a condition detected through this program, the physician is consulted prior to sending out the customary letter to the individual. No report at variance with the personal physician's report is dispatched. The policies of the personal physician with respect to his patient are followed.

The Industrial Health Council of Greater Atlanta is carrying out a program that represents one form of limited industrial medical services. This program constitutes a restricted case-finding activity. It represents no substitute for in-plant medical services, and in no degree does it embrace the work environment. Likewise this program in no measure seeks to displace the personal physician. The Council's activities, which are rendered through a mobile unit, lead to no diagnoses and no treatment, and provide no physical examinations. Because of these limitations, well observed, this Council has been accorded the support of official local medical organizations.

Although only slightly more than one year old, this program recognizes the need for an expanded constellation of tests, and as finances and growth permit, innovations of this character may be proposed to the committee of physicians who decide on such matters. In the presence of known physical defections as revealed through the Council's program, the one objective of the entire activity becomes that of the voluntary turning of the medically needy examinee to the physician of his own choice for appropriate ministrations.

Fig. 3.
Operating Efficiency: x-ray equipment is built in. Employee steps on small "elevator" and is promptly raised to required chest height. Floor of elevator is a pair of scales so he is weighed at same time. He steps off scales to height indicator, then goes down line for Ortho-Rater vision tests, then into room at rear for blood pressure and blood specimens.

At the same time it seeks to accomplish a worthy service for the individual and his company. Getting an individual to medical care when in apparent need can often mean much to his health, life, and his ability to work and earn a living. Protection to the individual means greater protection to the company, because good health directly affects accidents, absenteeism, turnover and compensation, and insurance costs.

It is a fact that medical interpretation of screen tests is necessary if all the potential benefits of the findings are to become an actuality. If a business or industry is to capitalize to the maximum on these potential benefits, it can only do so through the services of its own company doctor of medicine. Every company should have its own Medical Director or Medical Consultant through whom the significant screen test findings could receive ethical medical interpretation in terms of matching physical demands of the job to the physical capacity of workers and vice versa. Similarly, if the individual tested wants to enjoy the maximum personal benefits, he, also, can secure the same only from the personal physician of his own choice. All recipients of health services and medical care, including both management and labor, are dependent upon the physician giving due consideration to the relationships between occupation and health.

Training in Occupational Medicine

REPORT OF THE COMMITTEE ON EDUCATION AND TRAINING
Industrial Medical Association, 1957

THE Industrial Medical Association's Committee on Education and Training this year concerned itself with a survey of current activities in postgraduate education in occupational medicine in this country. The term, postgraduate education, is here considered to mean the formalized learning opportunities available to the physician already engaged in the practice of occupational medicine, and comprising something less than full-time student or resident status at a university or a medical center. Included in the term are programs on occupational medicine of various medical societies, short courses at universities, and the in-service training available to the members of the medical staffs of some industrial companies. The occupational medicine programs of medical societies will be reported at a later date. The present report deals with university short courses and industrial in-service training activities.

An unrelated appendage to the Committee's report is the annual collection of photographs of the physicians currently in graduate training in occupational medicine at the various university training centers. In accordance with the established format for this annual display, the photographs are arranged according to schools, and their legends reveal the school of medicine from which the trainee graduated, the year of that graduation, and the degree toward which he now works.

Short Courses

HARVARD University School of Public Health has for several years accepted physicians for two months' training in industrial health. This training is comprised of courses which are taken by master's degree candidates, and which are grouped so they may be given during February and March. Selected physicians who are experienced in occupational medicine may enroll as nondegree students for these two months.

New York University this year presented a two months' course during September and October. This required full-time attendance, and gave an intensive review of occupational medicine. This, like the course at Harvard, has been designed for the physician with experience in the field; and, so far as is known, both of these courses will be available again during the next academic year.

Short courses* of two and three days' duration were presented at three universities during the year: Buffalo, Miami, and Minnesota. These seem to have been in the nature of symposia, and were designed to interest general practitioners as well as specialists in occupational medicine. Along this same pattern, St. Luke's Hospital, Cleveland, held a two-day meeting on the subject of Environmental Medicine in Industry and Home.

Short, intensive courses on the technical and clinical aspects of practice have become available in satisfactory number. These have a duration of one to three weeks, and should meet adequately the needs of practitioners who wish to develop a working proficiency in one or another limited area with a minimum expenditure of time. The Institute of Industrial Health at the University of Cincinnati this year offered such courses in "Psychiatry in Occupational Health," and "Methods for the Evaluation of the Industrial Environment." The Robert A. Taft Sanitary Engineering Center, also located in Cincinnati, offered a course in "Occupational Radiation Protection" and one in "Environmental Radiation Protection." An array of special courses became available at New York University. These were entitled "Industrial Hygiene"; "Industrial Toxicology"; "Medical Aspects of Compensation"; "Air Pollution"; "Introduction to Radiological Safety"; "Radiological Safety Laboratory"; "Industrial Hygiene Laboratory"; and "Chemical Methods in Industrial Hygiene." As a generality it may be said that university faculties are reluctant to

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*Committee on Medical Education and Hospitals: Postgraduate Medical Education, *J.A.M.A.* 161:13, 1255, (July 28) 1956.

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interrupt their established work patterns to the extent required by intensive short course presentations. The unusual effort on the part of the New York University faculty merits enthusiastic support and encouragement.

Physicians living within commuting distances of universities that offer graduate training in occupational medicine may find profitable opportunities for attendance at courses as part-time students. So far as is known to the Committee, these universities are: California, Cincinnati, Columbia, Harvard, Johns Hopkins, Michigan, New York, Ohio State, Oklahoma, Pittsburgh, Rochester, and Yale. In addition to these, an increasing number of universities offer occupational health courses in their schools of medicine or sponsor intensive short courses that are useful to the physician in practice.

In-Service Training

IN-SERVICE training programs for newly hired technical and professional personnel are becoming major enterprises in large industries. Such programs have been developed for recent university graduates who come to work with a good, theoretical understanding of a particular field because the useful application of this understanding to industrial problems can be greatly expedited by a well-planned training program. The Committee was interested to learn the extent to which such training programs have been developed for industrial physicians.

A questionnaire was circulated to 500 major employers of whom 84 provided replies. Ten of the concerns were atomic energy facilities, governmental facilities, or universities. Certain of these places are known to be involved in formal graduate training programs for physicians and in other ways to be sufficiently different from private industry to warrant the exclusion of their data from the present study. There remained 74 categories of industry whose data form the basis of the study. These firms have 963,261 employees, and they engage 149 full-time and 418

POSTGRADUATE TRAINING IN OCCUPATIONAL MEDICINE
IN-SERVICE PROGRAMS FOR INDUSTRIAL PHYSICIANS AT 74 FIRMS

Types of Industry Queried	Firms Responding to Questionnaire		Number of Physicians in Reporting Firms		HOURS DEVOTED, BY AREA AND TYPE OF PHYSICIAN									
					GENERAL AREAS				SPECIAL AREAS					
					Orientation		Management		Safety		Industrial Hygiene		Medical Practices	
	Total Number	Number Employees	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time
Agricultural Implements	2	86,019	5	69					125		16			
Aircraft	3	105,000	32	1									40	
Automobiles and Trucks	2	3,750	1											
Baking	1	6,500							160				0-372	
Business Machines	3	105,000	7	5	0-100	0-8						160		
Chemicals	11	37,000	19	88			0-80	20-24			10			
Communications	2	85,000	7	60	40	5	3		10	3		3	40	15
Construction	2	8,500		14										
Copper Mining	1	1,900	1	2										
Electric Equipment and Electronics	4	146,887	15	30	16	4	6	6	3	2.5	2	1-2	40	4-8
Food Brands	3	26,000	1	50										
Glass	1	30.000												
Machinery	3	162,000	32	62	3½-40		98-150		0-20				40	
Mail Order	0													
Optical	1	4,500												
Metal Fabricators	1	5,000	1	3			80			5		10		10
Metals, Miscellaneous	3	6,000	3	3	½	0-½								

part-time physicians. Four of the respondents, each representing an industry, have no regular industrial medical service. Five other firms, each representing an industry, failed to reply to the questionnaire.

The questionnaire dealt with two general areas: orientation, as this would apply to the usual, newly hired technical or professional person; and management training. The latter comprises courses of lectures and organized discussion designed for junior management personnel for the purpose of hastening the development of and contributing to the selection of major management personnel. It is not unusual to find industrial staff physicians on the class rolls of such courses.

The questionnaire next dealt with three special areas: plant safety, industrial hygiene, and medical department practices. To give precise meanings to the questions, techniques and methods were stressed with regard to safety and industrial hygiene; and medical department practice was considered in eight subtitles: health education, treatment, examinations, rehabilitation, mental health, records and statistics, community medical relations, and community health resources. The results of the survey are shown on the accompanying Table. The number of hours of physician training time in the two general areas and three special areas are shown for full-time and for part-time physicians. Where the companies reported a spread of hours for a given training activity, the extent of this spread is shown. Where no company reported a particular training activity, the Table's cell for that activity has been left blank.

The responses indicate greatest interest in in-service training of physicians among companies in the following types of industry: aircraft, business machines, chemicals, electrical and electronics manufacturing, machinery, metals, and petroleum.

Full-Time Physicians. Of the 18 categories of industry employing full-time physicians, 12, or

POSTGRADUATE TRAINING IN OCCUPATIONAL MEDICINE
IN-SERVICE PROGRAMS FOR INDUSTRIAL PHYSICIANS AT 74 FIRMS (Continued)

Types of Industry Queried	Firms Responding to Questionnaire		Number of Physicians in Reporting Firms		HOURS DEVOTED, BY AREA AND TYPE OF PHYSICIAN									
					GENERAL AREAS				SPECIAL AREAS					
					Orientation		Management		Safety		Industrial Hygiene		Medical Practices	
	Total Number	Number Employees	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time
Paper	6	17,600	4	3					10				6	
Petroleum	7	11,800	6	5	5				6				40	
Public Utilities	0													
Railroad Equipment	2	7,500	1	3	¼		¼	0-½		0-½				.3
Railroads	0													
Shipbuilding	1	13,305		4										
Steel & Iron	2	41,000	7	5										
Sugar	1	2,000												
Sulfur	1													
Television	0													
Textiles	1	1,000		1										
Tires & Rubber	1	29,000	3	4		8			2		2	2	8	8
Tobacco	0													
Unclassified Industries	9	21,000	4	6	5			3		10		5		
TOTALS	74	963,261	149	418										

NOTES:
1. Where a single figure is given in a cell pertaining to number of hours, assume only one firm reported an entry for that cell.
2. Where two figures are given in a cell pertaining to number of hours, these indicate the range of hours reported by two or more firms.
3. Where no figure appears in a cell, no firm reported information which could be used as an entry for that cell.

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two-thirds, provide in-service training for these professionals. As was to be expected, the training area receiving greatest time emphasis is that dealing with industrial medical practice. Least training time is devoted to industrial hygiene techniques and methods. Considerable time seems to be devoted to training in the techniques and methods of industrial safety. This comes as no surprise, considering the close working relationships between the safety and medical departments of the usual industrial plant.

There appears to be a wide spread in the degrees of emphasis given to the general orientation of the full-time physician to plant operations, and an even wider spread in the opportunities for management training at the few places where this is available to him. The survey data confirm what was believed to be the case, that some industrial managements have decided to bring their industrial physicians into the management family. The reasons for this, the presumed and established results of this policy, and opinions held with regard to it would make an interesting but separate study for some future committee.

Part-Time Physicians. The survey reveals that less time is allotted to the in-service training of part-time physicians than is the case with full-time industrial physicians. The area of particular training emphasis again is industrial medical practice; and, although the Table does not show these details, the answers on the questionnaires indicate that major emphasis is placed on three components of the practice area: medical administration, emergency treatment of injuries, and in-plant medical care. Some emphasis is given to types of preplacement examinations, and to various kinds of mandatory periodic examinations; and some orientation to medical records and statistical procedures of the particular company is provided.

It appears that the part-time physician does not become familiar in a formal fashion with the personnel policies and benefit programs of his particular company, nor is he told the company relations with the medical community and community health resources. Apparently the part-time physician is not oriented to any management responsibilities and is expected to apply his general knowledge of sanitation and mental health to his routine duties. From this survey it appears that the part-time physician is expected to transpose his office practice into an industrial environment without being familiarized with the particular problems of the industry. This is explained in two fashions: either the industrial practice is a supplement to his private practice and he is too busy to become familiar with the particular problems of the industry; or no formal program has been evolved for part-time physician training, the problems being explored when they arise — another type of on-the-job training.

From this limited survey it appears that industry is not realizing the full potential of its part-time physician services, and that it might benefit from an enlargement of the physician's job. Such an enlargement would include an early understanding of management philosophy, so that the physician may discover for himself how best to carry on as a physician in the furtherance of that philosophy. He should, of course, become familiar with the potentials for hazardous exposures at the plant, not only for the purpose of early case detection, but for the possible contributions he can make to a prevention program. An early acquaintance with the personnel, compensation, and fringe benefit policies in effect at the plant is required knowledge for the successful industrial physician. Other requirements are an acquaintance with rehabilitation opportunities, and an understanding of how the interpersonal relationships of the industrial group bear upon the mental health of the people who compose the group. These are all points which can be achieved by well planned, intensive in-service training early in the part-time physician's service with industry.

Summary and Conclusions

1. POSTGRADUATE education for the physician in practice in occupational medicine is available at three principal places: various medical society meetings, university training centers, and the industrial plant where the physician works.

2. Two universities, Harvard and New York, now offer intensive two-month courses for the experienced practitioner who wants a general review.

3. Two universities, Cincinnati and New York (principally the latter), offer intensive courses on limited subjects of one to three weeks' duration.

4. Physicians within commuting distance of 12 universities may audit courses which are given to full-time, graduate students in occupational medicine. Virtually every medical school has courses applicable to this special field of practice, and many of these are open to the practitioner.

5. In-service training of the industrial physician is a postgraduate training opportunity which is probably not even reasonably well exploited. Full-time physicians receive better attention in this regard than do part-time industrial physicians. A full exploitation of this opportunity, especially as regards the part-time physician, would probably yield great returns to the industrial community.

Physicians in Training

Captain Herbert Christensen
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M.D., Temple U., 1951
D.Sc., Ind. Med.
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Ernest M. Dixon
M.D., U. of Virginia, 1947
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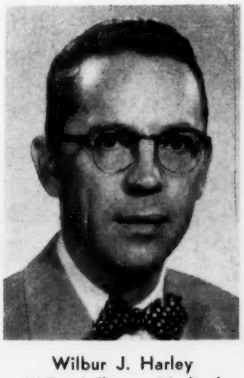
University of Cincinnati

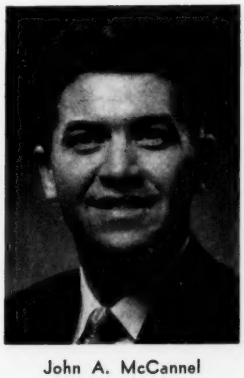
Paul L. Flynn
M.D., Hahnemann Medical College of Philadelphia, 1943
D.Sc., Ind. Med.
University of Cincinnati

Walter J. Gillogley
M.D., Creighton U., 1946
D.Sc., Ind. Med.
University of Cincinnati



Wilbur J. Harley
M.D., Jefferson Medical College, 1950
D.Sc., Ind. Med.
University of Cincinnati

Charles E. Lewis
M.D., Harvard U., 1953
D.Sc., Ind. Med.
University of Cincinnati



John A. McCannel
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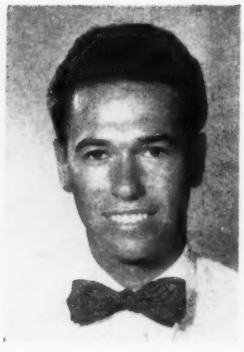

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M.P.H., Columbia U., 1955
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M.D., Medical College of
South Carolina, 1947
Master of Industrial Health
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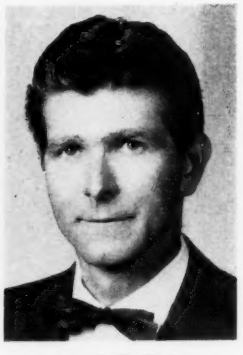

Joseph P. Kesler
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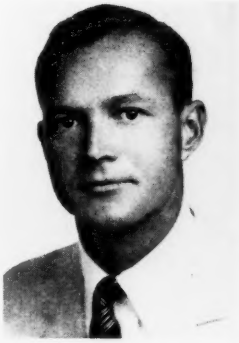
Physicians in Training



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Harvard University

Louis F. Saylor
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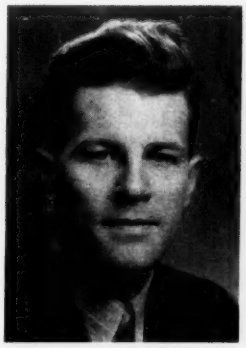
Harvard University



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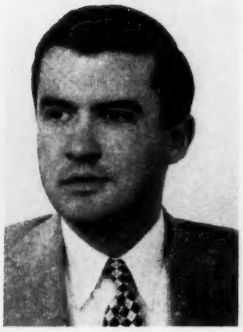

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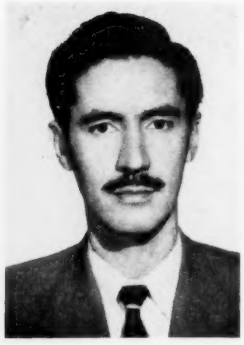

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Dermatology in Industrial Medicine

II. Of what value is pre-employment patch test?

THE COMMITTEE *on Dermatology of the Industrial Medical Association has inaugurated a project in which questions of practical aspects of occupational dermatoses are posed by the Committee and answered by members of the Committee. Following are two answers by members to the second question as stated above:*

(1) JOSEPH V. KLAUDER, M.D.
Philadelphia

IT IS pertinent to enumerate the following purposes for which patch tests are performed:

1. To determine (a) if a given substance exerts primary irritant action, and (b) what concentration of a known irritant no longer exerts such action. For example, what concentration of sulphuric acid gives negative results on the majority of patients tested? This method is a severe test of the tolerance of the skin to a given substance in contrast to exposure to that substance under working conditions. A positive result with the closed method of patch test and twenty-four hour contact is not infallible evidence that the skin will not tolerate the same substance and in that concentration under working conditions.

This purpose of the patch test may have practical application. For example, will working contact with substance X in 10% solution uniformly cause cutaneous reaction? If the results of the closed method of patch tests with 10% solution are negative, it is valid evidence that under working conditions that dilution will not act as an irritant. If 10% solution is about the minimum concentration that causes positive reaction it is possible that under normal working conditions that concentration may be tolerated by the skin.

2. A second purpose of the closed method of patch test is to determine the index of irritability (or reactability) of the skin. It is well known that this index, or threshold of irritability, is not fixed for each person. A "sensitive" skin is characterized by a low threshold, a "tough" by a high threshold. The former invariably characterizes the eczematic skin, the latter the skin of the Negro. To determine this threshold the following eczematogenous noxae are employed: 50% turpentine in olive oil, 5% solution of formaldehyde, 0.5% potassium dichromate, tincture of iodine, 5% ammoniated mercury in petrolatum, 1% ammonium fluoride and 1% sodium arsenate.

Positive reaction to all, or the majority of these substances indicates a low threshold. Conversely, negative reaction to all or the majority of these substances indicates a high threshold. As a "short cut" in determining this index, variation in reaction to kerosene (paraffinic type), was observed by the closed method.[1] Persons who had eczematous dermatitis were not included in the study.

All persons tested reacted positive. Reactions (surprisingly) varied (without correlation with complexion) from mild erythema to blistering reactions. The skin of the Negro reacted less qualitatively and quantitatively than that of white persons. Apparently these reactions were a criteria of the index of irritability of the skin. It would appear that persons with blistering reactions would be poor candidates for work entailing exposure to petroleum solvents. For example, the hands of workers manufacturing ball bearings and piston rings are saturated with such solvents.

Whether this purpose of the patch test has application in pre-employment examination is uncertain. How practical are these tests? A good history and examination of the entire skin surface may compensate for these tests. Moreover, how valid are the conclusions to be drawn from the results in relation to working exposure? The results will have no relation to degree and duration of exposure to an irritant, and these are important considerations in causation of dermatitis.

3. A third purpose of the patch test is to determine if a person is allergic to a given substance.

In industries with high incidence of sensitization dermatitis, the worker invariably becomes sensitized in the course of employment. Hence, a pre-employment patch test with the allergen to which he is exposed will be negative. If such allergen is high allergenic (for example, paraphenylenediamine, dinitrochlorobenzine and ethylmethacrylate) the patch test may serve to sensitize.

Pre-employment patch tests may be indicated in industries in which sensitization dermatitis is caused by allergens encountered outside of employment and to which a prospective worker may already be sensitized. For example, penicillin

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and streptomycin are outstanding causes of sensitization dermatitis among pharmaceutical workers exposed to these antibiotics. Allergic reactions to penicillin are common among the general public. Other allergens causing high incidence of sensitization dermatitis outside of industry are rubber, nickel and mercury.

A history of sensitization dermatitis to the allergen to which a prospective employee is to be exposed may compensate for a patch test. In doubtful cases such a test would be indicated.

A patch test may also be indicated to elicit cross-sensitization phenomena. A notable instance of this concerns compounds of quinone structure. These compounds comprise many that frequently contact the skin — for example, para-aminobenzoic acid (in some sunburn preventives), azodye (in nylon stockings), sulphanilamides, certain local anesthetics, para-phenylenediamine (hair dyes), scarlet red (topically applied medicament), picric acid and other aromatic nitro compounds. Cutaneous sensitivity may be present to some or to many of these chemically related compounds. If a prospective worker has a history of cutaneous reaction to hair dye, nylon stockings, a sunburn preventive, or sulphanilamide ointment, patch tests would be indicated if he is to be exposed to chemicals of quinone structure.

Sensitivity to iodine may include all compounds containing iodine such as iodoform. Likewise, sensitivity to quinine may include quinidine cinchonine, cinchonidine optoquine, and quinoline. Further discussion of cross-sensitization is afforded by Baer.[2] Space will not permit discussion of the cross-sensitization phenomena of botanically related plants and vegetables.[3]

It is incumbent upon the industrial physician to be cognizant of cross-sensitization phenomena in relation to the allergen to which workers in his domain are exposed. Such phenomena may not exist with a given allergen.

Other than for purposes of cross-sensitization, I see no indication for pre-employment patch tests of candidates who give a history of sensitization dermatitis to substances chemically and botanically unrelated to the allergen to which the candidate will be exposed.

If patch tests are performed for the aforementioned reasons, caution should be exercised to prevent an explosive reaction. If the closed method is performed the patch should be removed in one half hour or less. The open method would be more conservative.[4]

(1934 Spruce Street)

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(2)

GEORGE E. MORRIS, M.D.
Boston
DONALD J. BIRMINGHAM, M.D.
Cincinnati

IN GIVING our opinion as to whether pre-employment patch tests should be performed, it is first necessary to make clear the circumstances under consideration. The comments to follow do not apply to the patch testing of new garment, cosmetic, or other materials before putting them on the market.

First, it could be a patch test on a person who is seeking employment for a specific job in a plant where industrial skin hazards are known to exist, the assumption being that if tests to the materials to be handled resulted in a positive reaction, the applicant would be rejected, and that if the test were negative he would be presumed to be employable for such an exposure.

Secondly, it could be the case of a worker already employed in such a plant who is to be transferred to a different job, or who will contact a new chemical to be added to those which he has been handling. Were patch tests to be performed with the new material, the conclusions would be that a positive patch test would bar him from the position; whereas with a negative test he would be presumed to be able to do the work.

When superficially considered, pre-employment patch tests would appear to be valuable aids to management. However, in our experience, and that of many of our contemporaries, there are numerous factors which militate against their usage:

1. If the patient has not had prior contact with the chemical, he is apt not to show sensitivity to it on first application.[1]

2. The very application of the patch-testing material may sensitize the applicant or worker, to the chemical in question. In such a case, management or the physician making the test, in the event that it turned out to be positive, conceivably could be held responsible for any dermatitis that resulted from the patch test.

3. On the other hand, if such a test proved negative, and a worker consequently was assigned to the job, it would not preclude his developing a dermatitis. The application of a patch test cannot be considered to be an adequate index of the ordinary industrial exposure.

4. The natural concomitant of a negative patch test taken under such circumstances is for both management and the individual worker to believe that there is no hazard involved in subsequent

handling of the chemical by the worker. This attitude might well lead to severe dermatitis.

5. Even though the patch test were to prove positive, it could be a *false positive reaction,* due to many factors. One might be the failure to apply a nonirritant dilution of the chemicals. Such positive reactions have caused unnecessary rejection of applicants, or needless expenditures to eliminate supposed hazards which in reality do not exist.[2]

6. Another possibility is that the worker or prospective worker, indeed, might present a positive patch test; but still might be able to work with the offending chemical, provided that upon employment he habitually cleansed himself thoroughly and took care not to contaminate his skin unduly with chemicals.

7. There is no way of testing the possible combinations of chemicals which workers are to handle or to which they are to be exposed.

8. "It is impossible to test adequately for airborne poisons, physical agents and their influence (on the skin organs), trauma, powders and oils which interfere with bodily functions, or vital agencies . . . ."[2]

9. Nor is it possible to test against inappreciable or infinitesimal exposures.[3]

10. There are many loopholes relative to specific substances: e.g., patch testing with cutting oils can in no manner provide an inkling as to its potential in plugging the follicles.

11. With respect to selection of patch test material to be applied to the worker, much testing is not feasible since the usual worker brings to the dermatologist's office some six, eight, or more substances. Often the nature of these materials is unknown to the worker or his supervisor. In addition, the worker may include the soaps furnished in his plant, paper towels, etc. Thus, the dermatologist has little basis for choice of test items, as often they may not apply all.

With regard to the practical aspects of preemployment patch tests, there certainly exists an over-all consideration. Regardless of the foregoing technical and medical deterrents to preemployment patch testing, there are always to be considered legal regulations and union attitude toward such tests.

With these thoughts in mind, it is our recommendation that patch tests should not be applied or used as a guide in pre-employment, or when assigning a worker to a new job. Obtaining a good history at the time of the initial interview may elicit previous sensitization. A thorough physical examination, which should be a "must" when known irritants are to be handled, will uncover existing skin disease.

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Best Insurance

AUTO SEAT belts given to employees who drive their personal cars over 5,000 miles a year on company business by B. F. Goodrich Company, Akron. Company also has equipped its entire rental fleet of 900 autos (driven mainly by salesmen) with safety belts. A recent accident confirmed company's feeling that the move would be justified, if belts saved even one employee from serious injury or death: an employee involved in head-on crash suffered only minor injuries because company-supplied safety belt kept him from going into windshield. Employees urged to buy safety belts by Swift & Company, Chicago. Picture story on back page of firm's house organ shows two completely demolished cars — both involved in head-on crash. Driver wearing safety belt suffered bruised knee; other driver was killed instantly. "More and more people are learning that seat belts in a car or truck, properly used, are the best life insurance they can buy for the money," says article. "Many of the more than 1,000 persons killed during the recent Christmas and New Year week-ends would still be alive if they had been wearing safety belts."

—From *Industrial Relations News*, February 23, 1957.

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Industrial Medical Association

President Jones

The Year of the Outward Look

This President's Page is usually devoted to a message from the IMA President. This month—his last in office—it is given over to things said not by him, but about him. . . .

FOR THE Industrial Medical Association — as for other important organizations at the period of their Annual Meetings—

"The year is again at the Judgment Gate,
For its audit of worth and its carat-weight;
And the Critic shouts: 'Write!'
But the Scribe says: 'Hold!'
—Let the chronicles bide
While they balance the gold!"

This pilfered paraphrase is one of those injunctions to caution with which historians are familiar. History is more than a logbook. It needs perspective, and that, in turn, needs time. The critic—concerned with events—is in a hurry: uncomfortably aware that time will dull his barb, snuff out his importance. The historian—sensitive to meanings—waits: impersonal, patient, calm, his confidence strong in Time, the Great Assayer.

Meanwhile the observer—neither scribe nor critic—sets forth his observations. . . .

"JACK" JONES' term as President of the Industrial Medical Association has been "the year of the outward look." And Jack, simply by being himself, has been its protagonist. During his period of coming up the line—a year in the Second Vice-Presidency, another in the First, a third as President-Elect—he heard often the much-repeated statement that "industrial physicians talk mostly to themselves." This had been true: long were the decades when hardly anyone else would listen. But during those same years there had come to be much that needed to be said to the many who needed to hear it: managements, community leaders, physicians in private practice, workers in all kinds of occupations, the world in general. Some of it was being voiced on occasion, but for the most part tentatively and ineffectively. For unperceived reasons there was a failure in communication.

Could he do something about it?

In September, 1954, while he was IMA's First Vice-President, he decided to try. At the Eleventh International Congress on Industrial Health at Naples, Italy, he presented a carefully prepared study on "The Employee's Responsibility for Personal Health." Thus, in a sense, he began with the "world in general." And he began with a subject that, perhaps as much as any other, had been avoided in public discussions.

But why did he begin at all?

One answer may derive from the fact that he is a Quaker and was "moved to speak." Another is found in his career as a dedicated physician, and—after 34 years of dealing with industries and their employees—a dedicated *industrial* physician.

ELI SHERMAN ("JACK") JONES was born at Fairmount, Indiana, a small town in Grant County, about midway between Ft. Wayne and Indianapolis. He entered Indiana University in 1909, at age 18; received his B.S., and went on to graduate as M.D. at the University's School of Medicine in 1916; interned at City Hospital, Indianapolis; started his career as a surgeon in Hammond. His industrial affiliations began in 1923, with Hammond Bus Company. His Jones Clinic, in Hammond, now serves some 80 local industries varying in employee personnel from two dozen to 1500, with several exceptions as to a much larger number.

He is a Diplomate of the American Board of Preventive Medicine; a member of the College of Preventive Medicine; a Charter member of the World Medical Association; Fellow of the American College of Surgeons, the International College of Surgeons, and the Industrial Medical Association. His professional memberships include Lake County Medical Society, Indiana Medical Association, American Medical Association, Chicago Society of Industrial Medicine and Surgery, and Central States Society of Industrial Medicine and Surgery (IMA Component). He has been Chairman of the Industrial Health Committee of the Indiana Medical Association, and has held various offices in the Chicago and Central States Societies. He is on the hospital staff at St. Catherine's (East Chicago), and St. Mar-

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garet's (Hammond). At the last-named he is a member of the Executive Committee. And he is the Medical Member of the four-member Board of Trustees who recently built the 2000-bed Beatty Hospital (State Mental) at Westville, Indiana, and are now increasing its capacity to 3500 beds. He is a Mason (Shrine—Past Potentate), and a member of the Rotary Club (Past-President), and of the Chamber of Commerce.

WITH all this Indiana concentration, Jack is the "compleat" Hoosier—native and thorough. But never has he been provincial. Always he's been interested in things beyond the horizon. Some time before his identification with the administrative activities of IMA, he had done postgraduate work in most of the medical centers of this country and Europe; and, in his travels, he had acquired an extensive firsthand knowledge of what was going on in medical, and especially industrial medical, circles generally. His interest was more than curiosity; he thought about what he saw, and wondered about what he didn't see. An indication of the broadening and seasoning effect of all this may be noted in the differences—as to subject and scope—between his first published article and his latest. The first (*Ann. Surg.*, 1934) was entitled "Appendicostomy in Cases of Ruptured Appendix Associated with General Diffuse Peritonitis." The latest was "The Employee's Responsibility for Personal Health" (*Indust. Med. & Surg.*, 25:10,477 (October) 1956) . . . .

WHEN JACK assumed the Presidency of IMA on April 25, 1956, he found the Association "firmly entrenched in its unique and important place among the necessary and permanent representative groups in organized medicine." Subjectively, its affairs were in good shape; objectively, specialty recognition had been achieved, and the work of the various Committees had begun to attract national attention. In a manner of speaking, the ridge had been scaled, the fortress taken; consolidation and further entrenchment seemed next in order, and administrative ability would be the principal need. In these respects his year speaks for itself. The record is one of smooth and steady consolidation, entrenchment, expansion. Indeed, so smooth and steady has it been that it may be said his term is marked less by events than by meanings. One event may be noted: Jack's appointment, just prior to his Presidency, as a member of the Council on Industrial Health of the American Medical Association. The fact that the IMA Committees, this year as before, include such a large number of the most brilliant minds in medicine continues as the permanent Q.E.D. of Dr. Kehoe's statement that "the full-time practice of occupational medicine requires more intellectual competence and a greater variety of knowledge than does any other field of medical practice."

All in all, the year has been its own event.

Now for some of its meanings, and Jack Jones' part therein . . . .

FRIENDLY, pleasant, agreeable, this tall, slender, young-looking calm-seeming man is no calculating inspirationalist, no visionary, no crusader, no assertive seer. He is practical, has good judgment and an instinct for leadership, listens attentively and patiently, thinks clearly, grasps the elements and the nuances of a problem instantly, speaks to the point, and is selfless in his professional dedication. But square chin, firm mouth and observing eyes betoken the strength of independence and the courage of strong convictions. These qualities are so inherently characteristic that when he is roused to action, there is fire in him; when he is "moved to speak," his incisive staccato sentences can sting. That is well. For time and circumstances and his penchant for looking outward conjoined to put him on a hill top from which he could look far and see much. He looked, and saw; and he listened, and heard. And after a while he was "moved," and he spoke . . . .

HIS PRESENTATION at Naples, in September, 1954, was harbinger. He said: "Industry has gone far to protect workers. Safety devices are placed on every dangerous machine. Clinics are established, with medical and nursing staffs. Plant hygiene and industrial public health are 'musts.' Periodic physical examinations, usually on a voluntary basis and without charge to the employee, have become common. However, half a program is insufficient and certainly cannot do the whole job. To complete the picture we must answer, with action, the question: What can the employee himself do to protect his own health and well-being both inside and outside the plant? . . . . Careful observations of sound health and safety standards—in the plant by both employer and employee *and away from the plant by the employee*—can and should produce not only better working conditions within the plant but better physical and mental status for each employee. This will result in fewer accidents, less sickness, and less absenteeism."

Considering the time and place of their utterance, these were bold statements, but they were received with delight by many who held the same views while hesitating to voice them.

This was "prologue to the omens coming on."

ADDRESSING the Ninth Annual Conference for Business and Industry, at Houston, Texas, in September, 1956, on "The Small Plant and the Part-Time Physician," he began:

"It has been said that 'one of the biggest un-

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solved problems in industrial medicine is that of medical care for small industries.' This statement has been accepted so generally and repeated so often that it has become hackneyed and has lost its meaning. It is not a true statement.

"The problem is big, but it is by no means unsolved. The way to provide medical care for small industries has been developed, is being used, and has proved successful. The only real problem is one of extending the methods to wider use, applying them in more places. It is like painting an acre with a hand brush. The color will be clear and vivid on parts of the surface, but it cannot be argued that the paint that appears there wasn't properly applied because the whole acre may not be covered. No more should it be repeated that the problem of medical care for *small* industries is unsolved. The statement should be only that the solution isn't widely enough employed.

"There is an analogy here to the problem of medical care for *large* industries. If the problem is unsolved for the smaller concerns, it is also unsolved for the larger. One of the leading business magazines recently published a list of the 500 industrial companies—exclusive of public utilities —that rank as the largest in the country in point of sales. The first was General Motors, with 624,000 employees; the last was S. D. Warren Company, with 4,400 employees. A study of this list with reference to all available data discloses that one-third of these 500 largest industrial companies cannot be identified as having a Medical Director, or a Medical Department, or even a formal medical program. But who for that reason will assert that the problem of employee medical care with respect to the large industries is unsolved? So with the small industries. There are no figures at hand, but if a census were taken it would undoubtedly show that many thousands of the four million small businesses throughout the country are satisfactorily situated as to medical services for their employees. This is a meager proportion, but no less it is proof of the fact that the problem is not unsolved. The problem remains big—probably 'one of the biggest'—but it is big only because this proportion is small.

"It should be apparent that for all of industry, whether the employment situation is large or little, the problem is merely one of more extensive application of the established principles and accepted practices of industrial medicine."

He ended his address this way: "I started this talk with the statement that the real problem is simply that the solution is not being applied in enough places. I close it with the same statement. But whose fault is this? Surely it is not the fault of the physicians. Part-time or full-time, they are ready to go into the industrial plants of the country just as soon as the industries are willing to engage them, *and pay them*. The fact that there are so many plants, large and small, into which they have not yet gone is completely the fault of the industries themselves. The managements of some of them are as much in need of a physician as any of their employees. I leave you with that to think about."

IN NOVEMBER, 1956, he spoke at the Golden Anniversary Meeting of the Southern Medical Association, at Washington, D. C., on "The Community's Responsibility for the Health of the Industrial Worker." He said, in part: "In the main, the health of the industrial worker is of much more importance to his employer than it is to the community in which he lives. It has often been remarked that the best way to stay well is to get a job in a plant that has a good Medical Department. This is so true that there are many communities in which those who are officially charged with the community responsibility for the health of the people in general, could learn a great deal from the industrial physicians of the plants situated within their borders. I suggest that *if the average community expressed its responsibility for the health of all its people as completely and carefully as industry looks after the well-being of its employees, the health of the whole population would be vastly improved* . . . .

"Whenever a community gets to the point where it begins to think about the health of the worker in terms of such things as 'factory inspection,' then I propose that those most directly involved do some factory inspecting on their own account. If they will study the industries in their community, they will almost certainly find that the interest of the employers in the health and well-being of the employees will be both a good example and an effective reproach."

AT THE Second Symposium on Industrial Medicine and Toxicology, at the University of Miami School of Medicine, Coral Gables, Florida, in December, 1956, he said, in part: "By no means enough industrial physicians are aware of the bigness of their opportunity. This complaint comes from management. There is a rapidly-growing tendency among those who guide the destinies of big companies to want their Medical Directors to assume a larger share in the over-all affairs of the industry. Many physicians are afraid of this—afraid it might compromise the strictness of their impartiality between management and worker. Others feel that they ought to be physicians—and nothing else; that participation in the councils of management would be a departure from the intent and purpose of their educational and professional background.

"The fact is that management doesn't want partisanship, but *does* want statesmanship. Management *wants*—and management *needs*—educa-

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tion, guidance, counseling—all these in keeping with the requirements of the industry.

"The industrial physician who fulfills this need is not less the physician. On the contrary, he is *more*. When one thinks about it, the aggregate number of his patients—within the scope of his industrial practice—is the total number of the employees *plus one*. That extra *one* is the company itself. In the words of the poet, 'the present object makes probation.' Our field has many doctors who are as freely at home in the higher echelons as in the lower—who 'walk with kings nor lose the common touch.' *They* are industrial medical statesmen. Yet who would dare to say they are less than distinguished physicians?"

Apropos of the Symposium subject "What Industry Wants from Medicine," he said: "Suppose we turn it around to read, 'What Medicine Wants from Industry.' This business of medicine in industry is a two-way street. One thing medicine wants from industry is better pay for the physicians it employs—remuneration more commensurate with the educational requirements, and financial investment, and time, and dedication, involved in becoming, first, a physician, and, after that, a qualified *industrial* physician. Something else that medicine wants from industry is less equivocation about the doctor's place on the organization chart. In company parlance 'my superior officer' is a common expression. The subservience this often implies is ill-becoming to *any* physician."

For some reason he forbore to add what it well may be thought he firmly believes, namely, that the competent industrial physician has no "superior officer"—excepting only the interest of the patients he serves.

IN HIS Houston speech he corrected some long-bruited wrong ideas about Industrial Clinics. After a detailed description of his own Clinic at Hammond, he went on: "The Clinic physician realizes that treatment from some source is an essence in contacts with industrial patients. Having been well trained in diagnosis and treatment, he may decide that these are enough. He may not want to go further with the ill or injured than to 'get him well'—restore him to normal. Or, he may reach out toward 'prevention.' He may aspire to the *total* objective of industrial medicine —not only to *get the man well*, but also to *keep him well*. When he does this he becomes a real Industrial Physician . . . .

"Medical service in industry demands much of the physician who makes it a career. The physician who, through his clinic, becomes the *de facto* part-time Medical Director of a number of small plants soon learns that the demands upon him are in proportion to the variety of industries he serves and the processes with which he must become familiar. Sometimes these cover a wider range than will be encountered in many full-time situations. The full-time practice and the part-time practice of industrial medicine are more alike than is generally admitted."

THESE, and sometimes their contexts, were plain, blunt, perhaps daring, statements. They were heard by audiences of physicians, members of management, teachers, community leaders, and others. But they were not followed by any resolutions to abolish the rusty clichés, or to make it a condition of employment that the employee be responsible for his own health outside the plant. There was no proposal that managements suspend their smugness, and revise their "organization charts." The community leaders did not rush out to check up on their enforcement of traffic laws, smoke ordinances, sanitary regulations, methods of garbage disposal, or standards for the condition of streets and alleys and places of assembly. Nothing happened. But that was not of immediate consequence.

The importance of these statements is implicit in the fact that they were made, and the further fact that their making is the basis, and the beginning, of a complete about-face on the part of industrial medicine as a whole. No more the apologetic attitude! No more the lurking feeling of slight inferiority! No more the defensive position! The outward look may well presage the outward move. These are among their meanings . . . .

These things needed to be said, and it fell to Jack Jones to say them! He was completely in character in so doing. He is the apostle of the inherent rightness of industrial medicine. His call is to professional self-realization; if need be to professional self-assertion. It is strong and clear. Growing out of his own forthright integrity and his Andrew Jackson-like refusal to compromise with what he knows is right, it could be no less. It is a spine-stiffener for all in the industrial medical field, for "if the trumpet gives an uncertain sound, who shall prepare himself to the battle?" There is no challenge in it, no chip-on-shoulder; it contains no belligerency. It is merely an effective announcement, timely and salutary, that the Industrial Medical Association and its activities are now a positive force for the advancement of industrial medicine, and a striking example of assurance that IMA can put forward as leaders sincere and capable men, unawed and unafraid.

IF THE observer seems to anticipate the historian, so be it. Jack would be the first to deprecate the apparent haste. But it is due him to have it said about him now that, even at this early date, his term assays bright gold.

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Association News

Industrial Health Conference

GENERAL Chairman of the 1957 National Industrial Health Conference in St. Louis, April 22-26, is JEROME W. SHILLING, M.D., President-Elect of the Industrial Medical Association. RICHARD A. SUTTER, M.D., is Deputy General Chairman.

Committee Chairmen for the participating Associations are as follows:

INDUSTRIAL MEDICAL ASSOCIATION: WILLIAM L. MACON, JR., M.D., Conference Chairman; DOUGLAS A. RIES, M.D., Program Chairman; VINCENT T. WILLIAMS, M.D., Publicity Chairman; R. EMMET KELLY, M.D., Scientific Exhibits Chairman; DONALD L. TWEDELL, M.D., Arrangements Chairman; GEORGE H. McDONALD, M.D., Entertainment Chairman; JOHN W. BERRY, M.D., Banquet Chairman; and VENCEL W. HOLLO, M.D., Field Trips Chairman.

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION: ELMER WHEELER, Conference Chairman; LOUIS F. GARBER, Conference Co-Chairman; C. R. WILLIAMS, Program Chairman; WILLIAM E. SHOEMAKER, Publicity Chairman; ANDREW D. HOSEY, Scientific Exhibits Chairman; JOSEPH W. MILLER, Arrangements Chairman; JACK T. GARRETT, Entertainment Chairman; KNOWLTON J. CAPLAN, Field Trips Chairman; and JEROME E. MOLOS, Banquet Chairman.

AMERICAN ASSOCIATION OF INDUSTRIAL NURSES: MARGARET L. STEELE, R.N., Conference Chairman; PEARL K. JONES, R.N., Program Chairman; MARY GREGORY, R.N., Program Co-Chairman; CHRISTINA VERMETTI, R.N., Publicity Chairman; HELEN DAHM, R.N., Scientific Exhibits Chairman; ERMA MAZE, R.N., Arrangements Chairman; ELIZABETH FREESMEIER, Banquet Chairman; and MARGARET M. BARTON, Field Trips Chairman.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS: LOUIS F. GARBER, Conference Chairman; THOMAS F. MANCUSO, M.D., Program Chairman; TULA BROCARD, Publicity Chairman; ANDREW D. HOSEY, Scientific Exhibits Chairman; and JEROME E. MOLOS, Arrangements Chairman.

AMERICAN ASSOCIATION OF INDUSTRIAL DENTISTS: WALTER B. ELVERS, D.D.S., Conference Chairman; ALAN H. GREENWOOD, D.D.S., Program Chairman and Arrangements Chairman; and HARRY H. DOUGHERTY, D.D.S., Scientific Exhibits Chairman.

Field Trips

THOSE who are properly registered for field trips by noon, April 22, will leave by bus from the Sheraton-Jefferson Hotel between 8:00 and 9:00 A.M., Tuesday, April 23.

Dow Chemical Company — Madison Division. The Madison Division of Dow Chemical Company receives magnesium ingots from the Dow plant at Freeport, Texas. These ingots are alloyed and recast as feed stock for the rolling mill and extrusion plant. The products of the plant are plate, sheet, and extruded structural shapes which are widely used in the aircraft and trucking industries and for machine tool housings. A continuous casting operation is located at this plant and will be included in the tour. Those visitors not U.S. citizens will require advance clearance.

General Motors Corporation — Chevrolet Assembly Plant. Chevrolet Division of General Motors operates an assembly plant in which conventional automobilies as well as Corvette plastic body automobiles are assembled. The Corvette assembly involves special precautions to combat health problems arising from the handling and grinding of the plastic which constitutes the Corvette body.

McDonnell Aircraft Corporation. McDonnell Aircraft Corporation, employing 22,500 people, is the largest single employer in the state of Missouri. McDonnell manufactures the Voodoo and Demon jet fighters. The tour will include fabrication areas, "hush houses" under construction, use of radioactivity to locate misplaced tools during preflight inspection, 10,000-ton presses with appropriate safety devices, audiometric testing and hearing conservation facilities, and many other phases of aircraft production and the health and safety program. Attendance is limited to U.S. citizens.

Packwood Manufacturing Company. Packwood is a basic soap manufacturing plant, manufacturing industrial skin cleansers, waterless hand cleansers, and other cleansing agents from basic raw materials. A new plant is available for inspection by visitors. A new process, the Sharples continuous soap making process, is in operation and so arranged that various steps may easily be viewed. A soap tower (spray drying of soap powder) is also in operation. The products of this establishment are widely used for industrial skin cleansers, and the technology of their manufacture will be displayed for the tour.

Technical Exhibits

MORE than 100 Technical Exhibits will be displayed at Kiel Auditorium, during the Conference. The exhibits are designed to acquaint the industrial physician with all the latest developments in procedures and equipment that will aid him in his work. Among the Technical Exhibits are the following:

Aeroplast Corporation—Featuring Aeroplast spray-on plastic dressing . . . . Booth 53.

Alcon Laboratories, Inc.—Featuring rhinologic and sterile ophthalmic preparations . . . . Booth 34.

A. S. Aloe Company—Featuring complete planning service, available to those building or remodeling medical departments or laboratories . . . . Booths 4-6.

American Cancer Society—Featuring an educational exhibit showing the three-pronged program of the Society: Education, Research, Service . . . . Booth 42.

American Meter Company, Inc.—Featuring respiratory meter, oxygen meter, wet and dry test meters . . . . Booth 106.

American Optical Company—Featuring industrial vision program, respirators, and sound protectors . . . . Booth 12.

American Sterilizer Company—Featuring auto-

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claves, sterilizers, examining lights, and sterilizer cabinets . . . . Booth 48.

American Tobacco Company, Research Laboratory—Featuring a picture display in full color of the growing and processing of tobacco from the seed to the cigarette . . . . Booths 63-64.

Armour Laboratories—Featuring H. P. Acthor gel, Chymar, and Tryptar Ointment . . . . Booth 1.

Arnar-Stone Laboratories, Inc.—Featuring Americaine-Silicote, and Polygesic-Ascorutin-Bio . . . . Booth 57.

Astra Pharmaceutical Products, Inc.—Featuring Xylocaine, a local anesthetic for injection and topical application . . . . Booth 105.

Ayerst Laboratories—Featuring Kerodex creams . . . . Booth 65.

Bauer and Black—Featuring surgical dressings, adhesives, Tensor's bandages, Curad bandages, and Curity sutures . . . . Booth 79.

Bausch and Lomb Optical Company—Featuring Ortho-Raters, protective-corrective eyewear . . . . Booth 19.

Becton, Dickinson and Company—Featuring Wilson surgeon's gloves, syringes, needles, bandages, and vacutainers . . . . Booth 76.

Beltone Hearing Aid Company—Featuring audiometers . . . . Booth 16.

Bristol-Myers Products Division—Featuring Bufferin and Ammens . . . . Booths 99-100.

A. M. Brooks Company—Featuring hearing testing equipment . . . . Booth 92.

Buffington's, Inc.—Featuring Synthaloids, Dolopar, Doloro, Bufftabs . . . . Booth 60.

Burdick Corporation—Featuring physical medicine equipment . . . . Booth 87.

Carbisulphoil Company—Featuring Foille, Activol, Torcaine . . . . Booth 81.

Chattanooga Pharmacal Company—Featuring Hydrocollator steam packs and master units . . . . Booth 70.

Ciba Pharmaceutical Products, Inc.—Featuring the most recent pharmaceutical products. . . . Booth 103.

Coca-Cola Company—Serving ice-cold Coca-Cola . . . . Booth 7.

Continental Medical Bureau—Featuring data on positions available, and Doctor's Registry . . . . Booth 75.

Davis Emergency Equipment Company, Inc.—Featuring industrial safety equipment and toxic gas analyzers . . . Booth 85.

Joseph K. Dennis—Featuring insurance . . . . Booth 33.

Desitin Chemical Company—Featuring Desitin ointment, powder, lotion, hemorrhoidal suppositories, rectal Desitin ointment, and Desitin cosmetic and nursery soap . . . . Booth 32.

Doak Pharmacal Company, Inc.—Featuring Burosol antiseptic, Normaderm, Sav Skin, Lanaform, Tarpaste, and Dome-Aveeno . . . . Booth 20.

DoHo Chemical Corporation—Featuring Auralgan, Otosmosan, Rhinalgan, new Larylgan, Rectalgan, and Dermoplast . . . . Booth 90.

Dome Chemicals, Inc.—Featuring dermatologicals, wet dressings, Dome paste bandage, oral vitamins . . . . Booth 94.

Duke Laboratories, Inc.—Featuring Elastoplast bandages, unit dressings, Tecto, Nivea Cream-Skin Oil, Basis Soap . . . . Booth 86.

Eaton Laboratories—Featuring Furacin soluble dressing, Furadantin, Tricofuron, other dosage forms of Furacin, Furaspor . . . . Booth 22.

Encyclopedia Americana—Featuring 1957 edition, Encyclopedia Americana . . . . Booth 107.

Encyclopedia Britannica—Featuring 1957 edition, Encyclopedia Britannica . . . . Booth 9.

Equitable Life Assurance Society of the United States—Featuring 'Assurance of a Fuller Life' exhibit No. 2 Health Education Program . . . . Booths 45-46.

Evaporated Milk Association—Featuring literature of interest to industrial physicians and nurses . . . . Booth 95.

E. Fougera and Company, Inc.—Featuring Polysorb Hydrate and Aveeno products . . . . Booth 55.

Geigy Pharmaceuticals—Featuring Preludin, Butazolidin, new Sterosan . . . . Booth 56.

Otis E. Glidden Company, Inc.—Featuring Zymenol, Zymelose, Zylax, BSP liquid . . . . Booth 58.

Globe Industries, Inc.—Featuring resuscitators and oxygen therapy . . . . Booth 51.

Hillman Pharmaceutical Company—Featuring Hillman's D compound . . . . Booth 50.

Hygiene Research, Inc.—Featuring protective ointments and fogproofing material . . . . Booth 30.

Ille Electric Corporation—Featuring physical therapy equipment . . . . Booth 68.

Industrial Acoustics Company, Inc.—Featuring I.A.C. standard series '400' audiometric testing room, Model '400' . . . . Booth 43.

Ives-Cameron Company—Featuring Synalgos, Periclor, Dorana, Oxsorbil, and Mucara . . . . Booth 39.

Karel First Aid Supply Company—Featuring industrial hospital equipment . . . . Booth 61.

Keystone View Company—Featuring vision testing equipment, slide projector — lantern slides . . . . Booth 28.

Kimberly-Clark Corporation—Featuring educational program on menstrual hygiene and cold prevention . . . . Booth 73.

Licensed Beverage Industries, Inc.—Featuring display explaining that alcoholism is a medical and public health problem; that alcoholic beverage industry supports research . . . . Booth 74.

Eli Lilly and Company—Featuring pharmaceuticals and biologicals . . . . Booth 77.

Lincoln Laboratories, Inc.—Featuring burn spray, toxemia, vitamins, and related products . . . . Booth 41.

Maico Company—Featuring audiometers . . . . Booth 47.

S. E. Massengill Company—Featuring Salcort, Homagenets, Adrenosem Salicylate . . . . Booth 17.

Medco Products Company, Inc.—Featuring Medcolator, Medco-Sonlator . . . . Booth 13.

Medical Coaches, Inc.—Featuring mobile medical coach and trailer clinics . . . . Booth 80.

Medical Supply Company—Featuring first aid kits and refills, stretchers, salt tablets, burn treatment, poison ivy treatment . . . . Booth 18.

Merck Sharp and Dohme—Featuring most recent

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developments in pharmaceuticals . . . . Booth 98.

Metropolitan Life Insurance Company—Featuring service rendered to industry . . . . Booth 38.

Milburn Company—Featuring skin protective products, chemical resistance clothing . . . . Booth 44.

Mine Safety Appliances Company—Featuring noise detection instruments, ear protectors, artificial respiration, dust and gas detection instruments, first aid, and other safety equipment . . . . Booths 83-84.

National Cylinder Gas Company—Featuring medical gases, inhalation and hospital piping systems . . . . Booths 36-37.

National Livestock and Meat Board—Featuring nutrition education: folders, charts, booklets . . . . Booth 102.

Nepera Chemical Company, Inc.—Featuring Biomydrin and Biomydrin F nasal spray . . . . Booth 62.

New York Medical Exchange—Featuring discussion of problems relating to Medical Department personnel . . . . Booth 24.

G. H. Packwood Manufacturing Company—Featuring Pax skin cleansers and dispensing equipment . . . . Booth 88.

Paschall Laboratories, Inc.—Featuring Episcord inhalant, Episcorb nebulizer, Episcorb ointment, Episcorb dental hemostat, Pallab tung oil products, Pallab plastic finger guards, and Centalone steroids . . . . Booth 2.

Pepsi-Cola Company—Serving ice-cold Pepsi-Cola . . . . Booth

Peuchen Engineering Corporation—Featuring portable air cooling equipment for hot, enclosed and confined areas . . . . Booth 89.

Pfizer Laboratories—Featuring Bonamine, Tyzine, Toclase, Cortil, Sterane, Moderil, Sigmamycin, and Magnacort . . . . Booth 11.

Pharm-Craft Company—Featuring Coldene, Fresh deodorants, Ting, Physician's and Surgeon's soap . . . . Booth 31.

R. J. Reynolds Tobacco Company—Featuring Camel, Winston, Cavalier, and Salem cigarettes . . . . Booth 29.

Revlon Pharmacal Division—Featuring Medicated Silicaire . . . . Booth 3.

Ries Corporation—Featuring Moistaire, heat therapy equipment . . . . Booth 69.

Ritter Company, Inc.—Featuring examination and treatment tables, and ENT equipment . . . . Booths 14-15.

A. H. Robins Company—Featuring Ambar, Ambar Extentabs, Phenaphen, Donnagesic, Mephate, Robalate, and Robalate liquid . . . . Booth 101.

J. B. Roerig and Company—Featuring Atarax . . . . Booth 71.

Sanborn Company—Featuring Viso-Cardiette, Metabulator, Vector system, Visoscope, Twin-Viso, Twin-Beam . . . . Booth 78.

Schenley Laboratories, Inc.—Featuring Dorbantyl, Titralac tablets and liquid, Diafen, Colostat, Sedamyl . . . . Booth 23.

Schering Corporation—Featuring Chlor-Trimeton, Coricidin, ophthalmic preparations . . . . Booth 59.

Scholl Manufacturing Company, Inc.—Featuring surgical adhesives and dressings . . . . Booth 104.

Scientific Associates—Featuring research analytical-consulting laboratories . . . . Booth 8.

Shampaine Company—Featuring examining, treatment, and emergency-room furniture . . . . Booth 21.

Smith, Kline and French Laboratories—Featuring Compazine, Edrisal, Teldrin, Benzedrex, Vasocort and Trisocort Spraypak, Pragmatar, Acnomel, Quotane . . . . Booth 10.

E. R. Squibb and Sons—Featuring new therapeutic agents for prevention and treatment of disease . . . . Booth 82.

Stephenson Corporation—Featuring resuscitators and chemical breath test equipment . . . . Booth 27.

Sugar Beet Products Company—Featuring SBS-60 cream deodorant soap . . . . Booths 66-67.

Teet, Inc.—Featuring Vythene and other Tecsolv products . . . . Booth 54.

United States Safety Service Company—Featuring protective safety eye and headwear, salt tablets, carbon monoxide detector . . . . Booth 40.

U.S. Vitamin Corporation—Featuring Pantho-Derm cream and Pantho-F cream . . . . Booth 26.

Upjohn Company—Featuring recently developed pharmaceuticals . . . . Booth 25.

Vestal, Inc.—Featuring Vestal-SOC, Septisol, Staphene, Ves-Phene . . . . Booth 93.

Whitehall Electro Medical Company, Inc.—Featuring hydrotherapy equipment, x-ray developing tank . . . . Booth 35.

Whitehall Pharmacal Company—Featuring Anacin, BiSoDol, Sperti, InfaRub, Preparation H, Heet, Kolynos, Petro-Syllium . . . . Booth 72.

Wilmot Castle Company—Featuring Sterilizers and lights . . . . Booth 91.

Winthrop Laboratories—Featuring Phisohex, Zephiran, Fergon Plus . . . . Booth 52.

IMA Resolution

THE EXECUTIVE COMMITTEE of the Industrial Medical Association has unanimously approved the following resolution:

"Whereas, the American Medical Association has stated that poliomyelitis vaccine is both safe and effective; and

"Whereas, the American Medical Association has stated that everyone should be encouraged to be vaccinated, particularly those under 40; and

"Whereas, inertia and apathy are deemed primarily responsible for the failure of large segments of the public to be vaccinated; therefore, be it

"Resolved, that the Industrial Medical Association adopt a resolution respectfully suggesting to its members the following: (1) that each member may protect himself from paralytic poliomyelitis by taking all three vaccine inoculations, properly spaced; (2) that each member encourage other residents of the community to take the vaccine and give confidence in its effectiveness; (3) that all members willing to volunteer their services are to help effect immunization to all residents in the community; (4) that this is to be done at the request of and in conjunction with the policies of the Board of Health and local and state Medical Societies."

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The Total Incidence of Occupational Disease

ON OTHER pages of this issue there appear some excerpts from the occupational disease report of the California State Department of Public Health on the frequency of occupational diseases in that state for the year 1955. Reports for previous years are in keeping with this present one. This record takes note of 24,736 instances of trade diseases as reported by physicians. Rather than being exaggerative, such figures tend toward errors of omission, since manifestly not all physicians will have filed all occurrences and not all cases will have sought the services of physicians. From data now accessible it may appear that these figures exceed the total reported for all other states combined. This does not mean that California is any hotbed of occupational disease occurrence. The unhappy situation is that in most states, regardless of laws so requiring, reporting disgracefully is neglected.

Extrapolation is a dangerous scientific procedure, always to be utilized with reservation. Yet in this instance extrapolation of California's figures is far more promising as to accuracy than actual reports emanating from some states. The industries of the different states always are dissimilar. The nature of the exposures leading to disease hazards varies appreciably. Some states have no, or limited, compensation coverage for agricultural pursuits. Some states have enacted no occupational disease reporting laws. These are just a few of the pitfalls in the extrapolation now presented:

In the State of California, for the year of concern, the average worker population was 5,141,000. For the country, in its totality the employment embraced an approximate 66,000,000 persons. For California, the percentage of the whole approximates 7.8. Applying that figure in relation to California's reported occupational disease, the yield becomes 317,500 for the estimate of the occupational disease incidence for the United States. Without clinging to that number as presenting exactness, still it may be as near the true incidence of the nation as opportunity now affords.

California is to be felicitated on its contribution to a better understanding of the quantitation of occupational diseases.

Run After Every Streetcar

EMERY R. HAYHURST, a maker of maxims, was the source of one sagacious pronouncement worthy of day-by-day repetition. It was, "Run after every streetcar." Were he pontificating this day and not 25 years ago, he would have brocarded "Run after every bus." The story remains the same. His urging was that the man who ran after the bus and dropped dead a few feet short of his goal was not the man who ran after the bus yesterday and a score of times before. The constant runner doesn't drop.

The same story in a different vestment points a finger at the other man, well past 50, who for a score of wintry mornings hugs his fireplace hoping some heartier man with a shovel will come along and, for a consideration, clear the sidewalk. One snowy day, goaded by accumulated guilt, he gets out his ear muffs and shovel, and off to the snow drfits. Then comes that hospital record entry, "Dead on arrival." Had he shoveled snow 21 days instead of a belated one, he might be at that project now.

Into that pattern falls the boy who was given

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a calf at birth—the calf's birth. Overjoyed, he ran around with the calf across his shoulders — happy boy, happy calf. Next day the calf may have been a pound heavier, but the shoulder journey, just the same. And the day after that. Three years later the calf, now grown to a hefty thousand-pound bovine estate, still was happy with the morning routine, the same shoulder travel. Were the truth known, that tale probably was born on the lips of some ancient fairy tale maker of the Grimm era. Yet the Hayhurstian implication may be detected. To be able to face exertion, exert every day. The lap dog that excitedly chases a rabbit just for once, may keel over with canine heart disease. The dog that chases automobiles every day will never die of heart disease. He'll be run over by a car.

In the summer, the unwanted outpourings of our sweat glands add to the torment of the torrid days. Then comes winter. No need for profuse sweating to maintain that constant body temperature. The sweat glands, little wanted, are quite willing to indulge in dormancy, biding the return of the blood-heat days. Just try to work up a drippy sweat on a January morning — two overcoats and a seat over the register. Mighty little dripping of perspiration.

All our organs and tissues are like that — fully willing to take advantage of nonuse. The man with perfect eyesight who sits for a year in darkness, ends up blind. For that man or woman known to harbor no significant disease, and unhampered by defects that demand restraints, sometimes the worst is to heed those inevitable counselors who chirp protectively: "Now you must take everything easy." Except as to anger, and some temptations; don't take anything easy!

Every day run after one bus. If there be no bus, then just run!

Okulistyka Przemyslowa

WHAT follows is a book review of a medical publication printed in the Polish language, in Poland. All too many Americans are disposed to believe that in Poland all of medicine is at a standstill. This review, by Richarda N. Spurgeon and William M. Spurgeon, of Cincinnati, may serve to foster a contrary estimate of the situation.

OKULISTYKA PRZEMYSLOWA (Industrial Ophthalmology): EDWARD ZAGORA. Government Medical Printing Foundation, Warsaw, 1953, pp. 385, 166 illustrations, 38 zlotys ($9.50).

This book, written in the Polish language, is primarily for ophthalmologists concerned with prevention and treatment of eye disorders connected with industrial work. The chapter titles show the coverage of this field to be quite extensive: 1. Industrial Injuries to the Eye Caused by Solid Bodies; 2. Injuries of the Eye Caused by Chemical Substances; 3. Industrial Ophthalmologic Toxicology; 4. Damage to the Eyes Caused by Various Types of Radiation; 5. Thermal Injuries to the Eye; 6. Occupational Infections; 7. Nystagmus as an Occupational Disease; 8. General Problems of Eye Health of Industrial Workers (includes sections on prescription of glasses according to distance of work; cases of imperfect vision other than near-sightedness and far-sightedness; corrective exercises; motion of work and low contrast as causes of requests for glasses); 9. Optical Problems of Defective Vision Encountered in Industrial Ophthalmological Practice; 10. The Influence of Certain Disturbances of Convergence on Close Work; 11. Fitting of Eye Glasses and Other Optical Aids as Required for the Industrial Occupations of Patients: 12. Perception of Real and Apparent Motion for Rational Construction and Control of Machines and for the Safety of Their Operators; 13. Mass Examination of Eyes of Industrial Workers; 14. Methods of Discovering Malingering, Exaggeration, Falsification of Cases of Injury and Hiding of Defects; 15. Problems Connected with One-eyed Workers; 16. Rehabilitation of Workers with Poor Eyesight; 17. Work Problems of Blind People; 18. Perception of Color as Related to Hygiene, Safety and Work Output; 19. Illumination of Work Areas with Respect to Hygiene of the Eye.

Numerous references are given to both European and American literature. The illustrations, mostly black and white, help considerably in connecting the technological and ophthalmological parts.

This one medical publication here reviewed may not prove that all is well in medical Poland but it should serve as some indication that all is not chaos.

Triage

ANOTHER new word has popped up in articles on the medical management of disasters. Sorting of the injured is called "triage," and it is said to be a prime necessity when large numbers of people are hurt . . . Lt. Col. H. H. Ziperman of the AUS Medical Corps urges that the best-trained surgeon available do the job. He must decide questions of treatment, transportation, return to duty, etc. He must decide which cases are hopeless and can only be given medical comfort during the height of emergency. This is a hard chore for physicians who have been trained to keep everyone alive, even in hopeless extremes, and the public would probably think it cruel.

—From "Topics of Current Medical Interest," in *Arizona Medicine*, March, 1957.

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